

Approval Memo for Budget Revision
Finance, UNDP China

Date: 1-Dec-08

No. 1

1. Team Leader: KK

[Handwritten signature]
02/12/2008
[Handwritten signature]
1/12/08
[Handwritten signature]
3 Dec - 2008

4. Return to PM: Judy Li

2. Finance/SPMST: Cleared by GS&LL

5. Return a copy to Argus generator: Morris

3. CD: SN for approval/signature

6. Return this memorandum and a signed copy of the revision to Finance as soon as possible

Your approval is hereby requested for the attached budget revision
3345 POPS FSP DICOVOL (Award#: 00050191/Project#:00061862)

(v) This approval is within your authority.

() This approval exceeds your authority; The delegated approval memo is attached, and any comment taken into account.

This approval of the attached budget will change the resource situation as follows (all figures are in US\$):

SOF	Description	2008	2009	2010	2011	2012	Total(2008-2012)
Fund Code 62000	Total approved budget	13,875,284	2,472,210	1,959,445	1,176,010	936,875	20,419,824
	This approval (inputs variation)	0	2,703,683	1,835,840	1,018,530	441,947	6,000,000
	Total approved GEF budget after this revision	13,875,284	5,175,893	3,795,285	2,194,540	1,378,822	26,419,824





Finance Comments:

Initiation of a new project

Routing Slip for Document Clearance

UNDP China

Type of Document: ^{a/}	Project Document
Full Name of Partner:	Ministry of Environmental Protection
Project Title: ^{b/}	Improvement of POP-based Production of Dicofol and Introduction of Alternatives Technology IPM
Project ID: ^{b/}	00061862

Cleared by:	Signature:	Date:
Team Leader		Dec 3/08
Finance Unit ^{c/}		1 Dec. 2008
SP&MS Team		3 December 2008
Deputy CD		4 Dec 2008

<p>Comments:</p> <p>Dear Subing,</p> <p>Please kindly sign the Project Document of POPs Full-size Project Dicofol.</p> <p>Thanks for your kind support.</p> <p>Judy</p>

a/ Documents include memorandum of understanding (MOU), various agreements.

b/ If the document is related to a specific project.

c/ If the document is related to the Finance Unit.



3 December 2008

Dear Mr. Zou,

**Subject: Improvement of DDT-based Production of
Dicofol and Introduction of Alternative Technologies Including
IPM for Leaf Mites Control in China**

I am pleased to attach herewith two copies of the above-mentioned fully signed Project Document for your record. We would also appreciate it if you could forward one copy to the Ministry of Environmental Protection of China (MEP), for their record.

Thank you for your cooperation.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Subinay Nandy'.

Subinay Nandy
Country Director

Mr. Zou Ciyong
GEF Operational Focal Point in China
International Department
Ministry of Finance

CC: Mr. Yu Lifeng
Deputy Director General
Foreign Economic Cooperation Office
Ministry of Environmental Protection

Project Document for China dicofol project

COMPONENT 1:

COVER PAGE

Country P. R. China

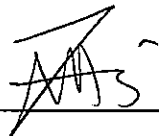
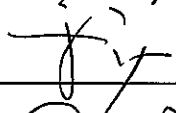

UNDAF Outcome(s)/Indicator(s): UNDAF Outcome 5: Increased role and participation in international arena and international cooperation
 Expected Outcome(s)/Indicator (s): CPD Outcome 9: Key United Nations conventions promoted through improved capacity to fulfill their obligations
 Expected Output(s)/Annual Targets: Output 9.1 Policy makers and general public engaged to support United Nations conventions implementation
 Executing Entity: Ministry of Environmental Protection of China (MEP)
 Implementing agencies: UNDP

Narrative

The project goal is to protect human health and the environment from the release of DDT occurring in dicofol production and consumption; and assist China to fulfill the obligations under the Stockholm Convention and benefiting global environment.
 The objectives of the project are: 1) to motivate the improvement of alternatives production and promote their usages, in particular, assess and demonstrate a suite of IPM-based interventions in pilot areas covering the major crops and ecological conditions; 2) to close down all non-closed dicofol production systems to eliminate the use of about 2,800 MT/a of DDT as intermediate in the production of dicofol, clean-up of waste facilities, wastes and contaminated sites as appropriate; 3) to enforce the optimization, supervision and monitoring on the closed-system dicofol production plants to minimize DDT residue and control the release of POPs wastes and other pollutants during dicofol production; 4) to develop national program for disseminating the project achievements.
 To ensure sustainability of the achievements of the project, related policy framework will be reinforced by establishing or revising pertinent regulations, polices and guidance, and the capacities of policy enforcement, wastes and pesticide management, crop planting, mite monitoring and residues monitoring will be greatly strengthened. In addition, a systematic M&E plan will be carried out to monitor and evaluate the overall performance of the project and to track the prospective global environmental benefits
 Through the implementation of the project, the production and consumption of 2,800 tons of DDT as intermediate in dicofol production will be phased out, the potential risks of 350 tons of DDT release due to residues in dicofol products and 1,350 tons released as DDT containing wastes during dicofol production will be minimized. The demonstration of alternative technologies, especially IPM-based technology will provide China with suitable techniques and experiences for the duplication of the techniques nationwide and will ensure food safety. In addition, the promotion of IPM and its increased awareness and acceptance among farmers will help to reduce the use of pesticide and sustain the development of the relevant crop production.

Programme Period: 2008 - 2012
 Programme Component: Energy and Environment for Sustainable Development
 Project Title: Improvement of DDT-based Production of Dicofol and Introduction of Alternative Technologies Including IPM for Leaf Mites Control in China
 Project ID: 00061862
 Project Duration: 4 years
 Management Arrangement: National Execution (NEX)

Total Budget	<u>\$17,650,000</u>
Allocated resources:	
• GEF	\$ 6,000,000
• Government	\$ 3,000,000
• Private Sector	\$ 500,000
• Other: Farmer	\$ 900,000
In kind contributions	
▪ Government	\$ 3,300,000
▪ Private Sector	\$ 800,000
▪ NGO	\$ 450,000
▪ Farmers	\$ 2,700,000

Agreed by (Government): 
 Agreed by (Executing entity): 
 Agreed by (UNDP): 

Ministry of Finance

Ministry of Environmental Protection

United Nations Development Programme

Project Document for China dicofol project

COMPONENT 2: SITUATION ANALYSIS

Problem to be addressed

China started producing DDT in the 1950's, there used to be 11 producing enterprises with highest annual output reaching 21,164 tons. Large scale production and agricultural application of DDT was stopped by the State Council in 1983. Currently, there remain only two enterprises producing technical grade DDT and one enterprise producing DDT preparation. Since 1995, the output of technical grade DDT has been maintained at the level of 5,000 – 6,000 tons/year. The output in 2004 was 3,945 tons.

In the disease control field, DDT was used to kill mosquitoes and pests in the malaria prevailing areas (mainly in the south of the Yangtze River) by the indoor residential spraying method. But since 2001, DDT has not been used in normal disease control.

In 2004, more than 73% of total DDT production was used as intermediate for the production of dicofol. 23% was exported to Africa and Southeast Asia for malaria prevention and control, and the remaining 4% was used as additives in the manufacturing of antifouling paint.

Dicofol is a cheap acaricide with broad spectrum, excellent efficacy and is widely used for mites control on a wide variety of fruits and crops in agriculture. Dicofol has been produced in China since 1976, and as of today, there are three dicofol technical product producers registered. Production capability of dicofol was once up to 10,400 MT/a and the production output was about 3,500 MT/a in average in recent years. Currently, there are two enterprises producing technical grade dicofol with non-closed system that consumes about 2,800 MT/a DDT and causes the discharge of about 1,000 MT/a of DDT containing wastes. There is also one enterprise basically produces with closed-system. While it does not use DDT as raw material to produce dicofol, however there are still discharge of DDT containing waste and residuals of DDT in dicofol products due to formation of DDT as intermediate during the production process, the discharge of DDT containing wastes is around 350 MT/a in the case of the production with maximum capacity. Moreover, the 10% by weight of DDT "impurity" in the dicofol products produced by these three enterprises, release 350 MT/a of DDT impurity to the environment during the spraying of dicofol in 23 provinces in China. The table below summarizes the current technical grade dicofol production in the year 2004:

Technical grade dicofol producers	Annual Production Capacity (tons)	DDT used as intermediate in dicofol production (tons)	DDT discharge with waste (tons)	DDT residues in dicofol consumption (tons)
Plant produced with closed system	2,000	n/a	350	180
Plant No. 1 produced with non-closed system	1,600	2,000	730	120
Plant No. 2 produced with non-closed system	600	800	270	50
Total	4,200	2,800	1,350	350

In the two plants that produce with non-closed production lines, the large volume of liquid wastes produced and accumulated in the dicofol production were not properly treated due to lack of management control and suitable technology. In one plant, more than 400 m³ (500 tons) of waste liquid with a DDT concentration higher than 0.16 g/L was collected in a glass fiber reinforced plastic pool and about 50 tons

Project Document for China dicofol project

of contaminated materials containing DDT was dumped in the plant. The distance from the dumping site to the nearest farmland is less than 1,000 meters away. Moreover, the scatter, leakage and evaporation of DDT during dicofol production were not negligible. The DDT content on the ground surface in the storage warehouse is as high as 0.36 g/g, which preliminarily reveals that the storage house, workshop and waste sites were highly polluted. Similar situation was found in the other plant.

At the only enterprise that produces with close system, the plant spent around 70 million RMB to improve its production technology during the PDF-B phase of the project, and the plant met the requirements of close system production process as listed in the Convention. As a result, DDT is only present in the tube and kettle during dicofol production. The transmission efficiency of DDT to dicofol increased greatly. Wastes from the production are well managed and treated with special measures. Samples taken and analyzed of dicofol product, waste acid and waste water show that DDT in all batches of dicofol products were below 0.1%, the domestic and international dicofol product standard. DDT is only present in the reaction kettle and its level in dicofol product, waste water and waste acid is below the standard, and meets the requirements of closed system dicofol production process.

Although the improved production technology meets the requirement of closed system production, there are still the release of DDT and other pollutants in the waste water and waste acid. The dicofol product and the workshop need to be put under strict control in order to minimize environmental risks of DDT pollution that may occur due to accident in the dicofol production or due to poor operation.

National institutional and legal framework

The safety management system for hazardous chemicals establish pursuant to the Regulations on Safety Management of Hazardous Chemicals is a basic management system to regulate existing industrial and commercial chemicals in the market currently in China. The regulations set up a national framework system for the management of chemicals involving multiple departments with each responsible for a particular field of work; covers the whole process from the production, operation, storage, transport and use to waste disposal of hazardous chemicals; and establishes management systems regarding listing of hazardous, chemical safety specification, chemical safety labeling, the review, permit and safety evaluation of economic activities related to hazardous chemicals, registration of hazardous chemicals, first aid for hazardous chemical accidents, etc.

In addition, China has established a pesticide safety management system aimed at regulating this category of high risk chemicals. The Regulations on Pesticide Management regulated the pesticide registration system, the pesticide production permit system, pesticide distribution permit system and the management system for safe use of pesticides.

Many sectors take their roles respectively to administrate agricultural chemicals. National Development and Reform Commission (NDRC) administrates manufacture, Ministry of Agriculture (MOA) is responsible to register and application, Ministry of commerce (MOFTEC) supervises the market, General Administration of Quality Supervision, Inspection and Quarantine (GAQSIQ) is responsible for the quality control of the pesticide product, and the Ministry of Environmental Protection (MEP), formerly the State Environmental Protection Administration (SEPA), is responsible for the prevention and control of the environmental pollution occurring thorough the whole life time of the pesticide.

China signed the Stockholm Convention and the Convention entered into force on November 11 2004. With the support of GEF, China had completed and submitted its National Implementation Plan (NIP) to the Convention. The activities for the reduction and phase out of DDT as intermediates for dicofol production, introduction of alternative technologies for production of dicofol have been identified as high priority actions in the NIP. Phasing out high toxicity and persistent pesticides, including DDT, is one of the priority activities to improve food safety and the environment in China.

China established the National Coordination Group (NCG) for the implementation of the POPs Convention which is led by the MEP and comprises of 13 relevant commissions and ministries, to provide guidance and coordination to significant activities for national POPs management and implementation of the Convention, and review the significant policies related to POPs management and control. The key

Project Document for China dicofol project

ministries and commissions take key responsibilities for the administration of hazardous chemical and pesticide, e.g. National Development and Reform Commission (NDRC), Ministry of Commerce (MOC), Ministry of Agriculture (MOA), General Administration of Quality Supervision, Inspection and Quarantine (GAQSIQ) are the members of the NCG.

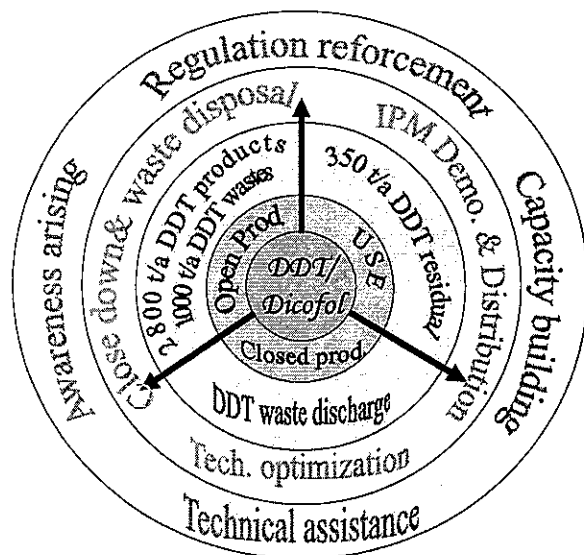
Chinese Government has prohibited the construction establishment of new facility for dicofol production. The application of dicofol has been banned in tea planting and the prohibition will be considered for the use in other crops during the course of the Project. Chinese Government encourages development and demonstration of new pesticides, which are environment friendly, with high efficacy and low toxicity.

More details in terms of the national institutional and legal framework are attached in Annex I.

COMPONENT 3: STRATEGY

Strategy to address DDT used for dicofol

In order to minimize the release and potential risk of DDT and in compliance with the requirements of the Stockholm Convention on POPs, China Government identified a long-term strategy to address the issues in its National Implementation Plan (NIP), which includes: 1) Implementation of IPM and improvement of alternative technologies to decrease the usage of dicofol containing DDT; 2) Closure of non-closed dicofol production facilities to reduce the DDT released from the product residue, impurity and waste; 3) Phase out the use of dicofol and correspondingly promote the phase-out of DDT as intermediates for dicofol production.



China is one of the largest countries in the world with 34 provinces, autonomous regions and municipalities. Therefore, the magnitude of the tasks for complying with the Stockholm Convention is an enormous challenge. Due to its sheer geographical size, one-step action of eliminating DDT used as intermediate in the production of dicofol would not be possible and/or effective. A phased project approach is therefore necessary to first target selective controlled areas, and to gain knowledge and experience to be used as basis to further design a national replication program to disseminate the results and experiences of the demonstration phase.

The first phase project proposed herewith addresses the immediate objective of improving closed-system dicofol production technology to meet Convention standards, closing down the non-closed dicofol production to eliminate the use of DDT for such production and meanwhile reducing and preventing the

Project Document for China dicofol project

threaten accruing from the pollution of DDT around the production facilities to be closed down. In addition, the effectiveness of IPM-based interventions to replace dicofol for leaf mites control will be verified in representative areas.

Achievements of PDF-B

In order to develop the action plan for the first phase, the systematic investigations and evaluations below have been carried out with the support by GEF and other donors, e.g. Italy, including:

1. Investigation on the production and use of dicofol; selection of the demonstration counties; evaluation on the alternatives and alternative technologies; and formulation of the IPM demonstration program (Annex II);
2. Investigation on the production facilities, waste and surrounding environment of the two non-closed production enterprises; putting forward the requirement on the production facilities clean-up, waste disposal program and the environmental risk assessment of the contaminated site; at the same time, coordination with the two enterprises on the production transfer and re-employment of the workers. (Annex III)
3. The enterprise that is capable of producing dicofol with closed-system has improved its production technique/ facility. After being monitored and assessed by the third-party experts, the updated production technique/ facility basically meets the relevant requirements stipulated in item (iii) of Part I under Annex B of the Stockholm Convention. However, in order to further control the release of DDT during the production process, the program of enhancing the management and self-control of the enterprise and strengthen the monitoring and supervision from the central level to the enterprise has been put forward after the investigation and consultations with the relevant experts. (Annex IV).

Additionally, the institutional arrangement and policies on DDT and dicofol have been investigated so as to set up pertinent institutional strengthening program. The monitoring indicators and methodology for the full-size project as well as the project implementation management were consulted with relevant stakeholders and developed.

Root causes and barriers analysis

As a developing country, China still faces major barriers for implementation of this strategy. Such barriers include: 1) The prices of currently available alternatives are generally higher than dicofol that will increase the cost of production of crops. 2) Farmers rely on dicofol which has been proven effective at acceptable cost. They are unwilling to shift to new techniques because of higher costs and the risk of failure that may associate with adopting new techniques; 3) Insufficient capacity to conduct IPM training and promotion; 4) Lack of environmental sound experiences in closed-system production technology of dicofol, especially on pollution control measures of wastewater and solid waste; 5) Weak supervision and management of existing unqualified production, sales and distribution of dicofol, and on waste disposal.

Project Objective and Indicated Outputs

The proposed four-year project will help China to fulfill the requirement of the Convention. Consistent with this objective and take account of the achievements of PDF-B project, the project will address the above issues on priority basis by: 1) Strengthening the current institutional capacity, establishing an effective coordination and management mechanism and reinforcing policy framework to facilitate the elimination of dicofol and promotion of alternatives; 2) Improvement of alternatives production and promotion of their usages, in particular, the assessment and demonstration of a set of IPM-based interventions in pilot areas covering the major crops and ecological conditions; 3) Closure of both non-closed dicofol production facilities to eliminate the use of about 2,800 MT/a of DDT as intermediate in the production of dicofol, clean-up of waste facilities and contaminated sites as necessary that will lead to the elimination of 170 MT/a DDT release due to residues in dicofol products, and the reduction of 1,000 MT/a DDT containing wastes released during dicofol production; 4) Enforcement of optimization, supervision and monitoring on the closed-system dicofol production plant to minimize DDT residue and

Project Document for China dicofol project

control the release of POPs wastes and other pollutants during dicofol production that will minimize 180 MT/a DDT release due to residues in dicofol products, to minimize and control 350 MT/a of DDT containing wastes released during dicofol production; 5) Development of a national program for disseminating the project achievements and for achieving total phase out of the production and use of dicofol. In addition, a systematic M&E plan will be carried out to monitor the project objectives and outputs, and to track the prospective global environmental benefits.

Global Environment Benefits

DDT as one of POPs with the longest history of production and use, is capable of trans-border long-range transport, bioaccumulate in human and animal tissue, biomagnify in food chains, and to have potential significant threats on human health and the environment far from its resources, therefore, China is keen on the phase-out of DDT production and use and the sound disposal of its waste so as to minimize its release to the environment which will not only benefit the environment of China but also contribute to global environment as well as human health. Through the implementation of the project, significant global environment benefits will be achieved through the elimination of release of DDT into the environment:

- 1) The production and consumption of 2,800 tons/a of DDT used in the non-close system dicofol production in two enterprises will be phased out; the risk during DDT transportation from the DDT production plant to these two production facilities will be minimized; the potential risks of 170 MT/a DDT release due to residues in dicofol products will be eliminated; and 1,000/a MT DDT containing wastes released during dicofol production will be minimized and controlled;
- 2). Through the retrofitting and improvement of the production facilities in the only plant that produces with closed system, the potential risks of 180 MT/a DDT release due to residues in dicofol products will be minimized to the level below 0.1%, the domestic and international dicofol product standard, and 350 MT/a of DDT containing wastes released during dicofol production will be minimized and controlled;
- 3) Furthermore, the project will support activities relating to the disposal of hundreds tons of on-site DDT wastes previously accumulated in the two dicofol production facilities that will be closed as a result of the implementation of this project.

As a typical persistent organic pollutant, DDT as well as its metabolites can spread through atmosphere, biosphere and ocean current. During the spraying of dicofol by the farmers in 23 provinces of china, DDT may release to air and transmit to the global environment via the global migration processes. DDT polluted water flows to the river and ocean and will eventually affect the global environment. The implementation of this project will reduce DDT and dicofol level in air, water, soil and agricultural products and thus will not only improve the local environment but will extend significant contribution to the global environment to reduce the potential harm to the global ecosystem and human health.

In addition, this project will help China to strengthen its capacity for the elimination of dicofol and promotion of alternatives; gain valuable experience to achieve sound management of chemicals. The demonstration of alternative technologies, especially IPM-based technology will provide China with suitable techniques and experiences for the duplication of the techniques nationwide and will ensure food safety and strongly strengthen the capacities of crop planting, mite monitoring and residues monitoring. Being one of the biggest agricultural countries in the world, the efforts of China on the effective reduction of the residue of pesticides including POPs in food and crops will make significant contribution to the global food and environmental safety as well as human health in this planet.

Furthermore, the promotion of IPM and its increased awareness and acceptance among farmers will help to reduce the use of pesticides remarkably and sustain the development of the relevant crop productions. The experience on IPM application and replication in China can be extended to other developing countries, which is conducive to global sustainable management of POPs pesticides avoiding the environmental pollution and health risk by excessive or improper use of pesticides in the developing countries.

Project Document for China dicofol project

Mainstreaming Gender in Reduction and Elimination of POPs

In daily life, men, women, and children are exposed to different kinds of toxic chemicals include POPs in varying concentrations. The level of exposure to toxic chemicals – as well as the resulting impacts on human health – is determined by social as well as biological factors. In rural areas of China, most chemical exposure is linked to the use of pesticides include DDT-based Dicofol in agriculture. The improper use, management and storage of pesticides can result in contamination of air, food, soil, and drinking water (e.g., through pesticide run-off), leading to increased human exposure and associated health risks. Further more, POPs exposure is adversely effecting both the development of the fetus as well as the children. This exposure is especially high to infants that get most of their “food” through breast feeding, where the highly fat soluble POPs are transferred from mother to child.

So by reducing production and use of DDT, the women are a) reduced from exposure of POPs leading to ameliorated health situation for them; and b) are not poisoning their off-spring through breastfeeding. During the implementation, the project will address the priority concerns of vulnerable groups including female farmers and workers and the poor to assess and strengthen capacity to reduce and eliminate DDT. The project will ensure the females’ participation in the related activities of training and capacity building. In addition, there will be two overarching interventions – awareness raising and multi-stakeholder’s participation – that will contribute to ensuring the successful implementation of gender mainstreaming.

COMPONENT 4: RESULTS AND RESOURCES FRAMEWORK

PROJECT RESULTS AND RESOURCES FRAMEWORK

Intended Outcome as stated in the Country/ Regional/ Global Programme Results and Resource Framework:				
CPD Outcome 9: Key United Nations conventions promoted through improved capacity to fulfill their obligations				
Outcome indicators as stated in the Country/ Regional/ Global Programme Results and Resources Framework, including baseline and targets.				
Outcome indicators and Targets: Implementation of the Stockholm Convention supported through strengthened capacities and policies, especially in the area of reduction of pesticides.				
Applicable MYFF Service Line: Achieving the MDGs and reducing human poverty				
Partnership Strategy				
UNDP will be the GEF Implementing Agency, responsible for monitoring and evaluating project objectives, activities, output and emerging issues. UNDP will manage the GEF fund based on the UNDP established procedures on GEF-funded projects.				
Project title and ID (ATLAS Award ID): Improvement of Production Technology of dicofol from DDT and Introduction of Alternative Technology including IPM Technology for Leaf Mites Control in China				
Intended Outputs	Output Targets for (years)	Indicative Activities	Responsible parties	Inputs
1 Capacity building and policy making	1-4 years		MEP, in collaboration with MOA, NDRC, CIUs and other related stakeholders	GEF Financing \$300,000 Co-financing \$600,000

Project Document for China dicofol project

<p>1.1 Strengthened coordination mechanism for DDT phase-out in both country-level and demonstration areas</p>	<p>Established first year, operate throughout project period</p>	<p>1.1.1 Strengthen National Steering Group (NSG) consisting of CIO, MOA, and other key stakeholders</p> <p>1.1.2 Establish County-level Steering Group (CSG) in each demonstration county</p>		
<p>1.2 Improved institutional capacity for Integrated Pest Management (IPM) promotion, application, mite and residues monitoring</p>	<p>Strengthened in first year and operate continuously later.</p>	<p>1.2.1 Strengthen the capacities for IPM promotion, pesticide residues and mites monitoring in three demonstration county centers through training the staff, complementing with necessary equipment and reinforcing operation rules.</p>		
<p>1.3 Strengthened capacity for Environmental Sound Management (ESM) of POPs stockpiles and wastes</p>	<p>Strengthened in first year and operate continuously later.</p>	<p>1.3.1 Train relevant local EPBs and Solid Waste Management centre to strengthen capacity on waste management, and staff from relevant local environmental monitoring station and technicians from dicofol production plants on DDT monitoring</p>		
<p>1.4 Improved capacity for policy enforcement</p>	<p>Strengthened in first year and operate continuously later.</p>	<p>1.4.1 Train the staff of relevant sectors, departments at central and county level about relevant policies on DDT and dicofol to enhance their understanding</p> <p>1.4.2 Organize at least four field visits to the demonstration counties to inspect situations for IPM application, pesticide use and distribution and at least four site visits to the closed-system and non-closed system dicofol production plants to check the production situation.</p> <p>1.4.3 Integrate the enforcement requirement of DDT and dicofol relevant policies into routine tasks.</p>		
<p>1.5 Reinforced policy framework for DDT and dicofol reduction</p>	<p>First to third year</p>	<p>1.5.1 Develop, issue, and put into effect a) the policy to ban the dicofol productions in non-closed system at central level, b) policies to forbid the use of dicofol and to encourage alternatives in demonstration areas, c) policy to encourage R&D, production and application on alternatives</p>		

Project Document for China dicofol project

2 Implementation of IPM demonstration program			MEP, in collaboration with MOA, CIUs and other related stakeholders	GEF Financing \$3,500,000 Co-financing \$8,300,000
2.1 IPM demonstration program and Operational Manual developed	Developed first year and updated each year	2.1.1 Develop and update of the IPM implementation plan. Compile Operation Manual and training material for three demonstration crops		
2.2 Technicians and farmers trained	In first and future years	2.2.1 Select trainers and conduct training of trainers in three counties with 80 trainers for each county. Update knowledge of trainers about IPM practices by continuous training course each year. 2.2.2 Train about 30,000 farmers in each county by Farmer School, with indoor training and in-field training.		
2.3 IPM implementation and dicofol use in demonstration areas eliminated	30,000 mu (1 hectare = 15 mu) for each crop in first year, 60,000 mu for each crop in second year, and 60,000 mu for each crop in third year. Among which, 1,500 mu for apple and citrus will apply predatory mites each year	2.3.1 Implement the IPM program for apple, citrus and cotton planting with each crop in 150,000 mu (1 hectare = 15 mu) with agriculture control, monitoring and forecasting and alternative chemicals when the mite harm are founded to exceed the economic thresholds. Among which, 1,500 mu each year for each crop will apply predatory mites scheme, with complementary measures of monitoring & forecasting, planting weeds, agricultural control, light luring yellow. Alternatives chemicals will be used only when the mite harm exceeds the economic thresholds. 2.3.2 Develop and implement IPM impact assessment plan.		
2.4 Public awareness of IPM and Stockholm Convention raised	1-4 year	2.4.1 Compiling dissemination materials in terms of official, manufactures and dealers of pesticide, farmers, dealers and consumers of agriculture end-products to promote understanding of the potential risk of dicofol and DDT, and actions to reject the use directly or indirectly dicofol and DDT		

Project Document for China dicofol project

<p>2.5 Manufactures and research institutes motivated to improve alternatives that are more environmental friendly and cost-effective</p>	<p>The first, second and third year</p>	<p>related products.</p> <p>2.4.2 Conduct public awareness via various approaches, e.g., broadcast, television, mobile, hot line, newspaper, post, etc.</p> <p>2.5.1 Developing motivated plan to attract industries to participate in the project, assess participating products by pilot planting for economic feasibility, effectiveness and impact of these alternatives of these alternatives.</p> <p>2.5.2 Disseminate results of the assessments and promote the best alternatives to the farms.</p>	
<p>3 Non-closed-system dicofol production facilities closed down</p>			<p>GEF Financing \$930,000</p> <p>Co-financing \$1,000,000</p>
<p>3.1 Non-closed system dicofol production facilities closed down and relevant workers retrained.</p> <p>2,800 MT/a DDT production and consumption eliminated. 1,000 MT/a waste containing DDT reduced correspondingly.</p> <p>Approximate 170 MT/a DDT released to environment via the use of dicofol products with DDT impurity reduced.</p> <p>Compensation or resettlement need will be supported by co-financing.</p> <p>3.2 Risk Assessment</p>	<p>The first year</p> <p>The first year</p> <p>The second year</p> <p>The second year and later</p>	<p>3.1.1 Preparation work and action plan, including development of guidelines for clean-up of DDT decontamination equipment and workshop, wastes and ESM of contaminated sites. Measures for preventing and mitigating the potential environmental and health risks that arise from such clean-up and disposal operation will be taken and acted on</p> <p>3.1.2 Carry out trainings for relevant workers on safe production, waste management, etc.</p> <p>3.1.3 Implement the closure by related government departments, including a coordination meeting, prohibition instruction promulgation and label the production district.</p> <p>3.1.4 Cleanup of DDT contaminated equipment/workshop/waste, package the wastes</p> <p>3.1.5 Transport and destroy DDT wastes</p> <p>3.2.1 Carry out risk assessment to the closed production sites, develop measures needed to control the risk of the contaminated sites.</p>	

Project Document for China dicofol project

3.3 Site Cleanup	The second year	<p>3.3.1 Develop measures needed to control the risk of the contaminated sites.</p> <p>3.3.2 Facilitate the implementation of institutional control measures as early as possible.</p>	
4 Optimization of existing closed-system dicofol production			<p>GEF Financing \$270,000</p> <p>Co-financing \$300,000</p>
<p>4.1 Optimization of existing closed-system dicofol production</p> <p>4.2 Develop and carry out periodical monitoring and inspection plans.</p> <p>Approximate 180 MT/a DDT released to environment via the use of dicofol products with DDT impurity minimized.</p> <p>350 MT/a waste containing DDT minimized</p>	<p>The first year and later</p> <p>The first year and later</p> <p>The first year and later</p> <p>The first year and later</p> <p>The first year and later</p>	<p>4.1.1 Improve the operational rules and skills of closed system dicofol production at Yangnong pesticide Co. Ltd., in particular the rules and skills with regard to the management of the wastewater and the waste acid released from the dicofol production.</p> <p>4.1.2 Trainings for enterprises and stakeholders on improved operational rules and the requirement on record and data report mechanism.</p> <p>4.2.1 Set up a framework on periodical supervision and monitoring of DDT in the workshop of dicofol production facility, the wastewater, the waste acid dicofol products.</p> <p>4.2.2 Coordinate with enterprise and local EPB on the framework on periodical supervision and monitoring of DDT or other POPs in the dicofol product, the wastewater, and the waste acid and other pollutants.</p> <p>4.2.3 Select qualified firm or institute to carry out independent monitoring the potential DDT release at least twice per year, for inspection and verification of the eligibility of the dicofol product in Yangnong Group continuously.</p>	
5. Monitoring and evaluation plan			<p>GEF Financing \$250,000</p> <p>Co-financing \$250,000</p>

Project Document for China dicofol project

<p>5.1 M&E plan with annual and terminal reviews/audits developed and conducted</p>	<p>The first year</p> <p>Every year</p> <p>Every year</p> <p>Every year</p> <p>Every year</p> <p>Every year</p> <p>The end of second and fourth year</p> <p>Every year</p>	<p>5.1.1 Hold the Inception Workshop (IW) and Prepare the Inception Report</p> <p>5.1.2 Verify impact indicators by field visits, questionnaires, interviews and monitoring as appropriate</p> <p>5.1.3 Prepare Quarterly Progress Report</p> <p>5.1.4 Prepare Annual Project Reports (APR) and Project Implementation Reviews (PIR)</p> <p>5.1.5 Convene Annual Review Meetings</p> <p>5.1.6 Prepare Minutes for Annual Review Meetings</p> <p>5.1.7 Carry out mid-term and terminal external evaluation</p> <p>5.1.8 Carry out annual project financial audits</p>		
<p>5.2 MIS developed and sustainability maintained</p>	<p>First year developed and later maintained</p>	<p>5.2.1 Develop and maintain the computerized MIS</p>		
<p>5.3 Impacts of social, environmental and human health assessed</p>	<p>The fourth year</p>	<p>5.3.1 Prepare Project Completion Report (PCR), with social and economic impact assessment</p>		
<p>6 Preparation of the national replication program</p>	<p>The fourth year</p>			<p>GEF Financing \$300,000</p> <p>Co-financing \$300,000</p>
<p>6.1 Effectiveness of sustainable alternatives verified</p>	<p>The fourth year</p>	<p>6.1.1 Assessing and verifying the effectiveness of the alternatives applied in the demonstration areas</p>		
<p>6.2 Project experiences summarized for dissemination</p>	<p>The fourth year</p>	<p>6.2.1 Summarizing the lessons and experience in the demonstration areas, convene a two day technical workshop to discuss the main issues to be taken into consideration for preparation of the national replication program</p>		
<p>6.3 National Replication Program (NRP) developed</p>	<p>The fourth year</p>	<p>6.3.1 Carry out investigation on the other areas of China about the consumption of dicofol and management issues</p>		

Project Document for China dicofol project

6.4 Stakeholder including NGO and private sectors for NPR implementation motivated	The fourth year	6.3.2 Hold three regional consultation meetings to discuss with local authorities and key stakeholders about the feasibility of the application of IPM-based alternatives for mite control	
	The fourth year	6.3.3 Develop National Replication Program (NRP) based on the experiences in demonstration areas, the results of above investigation, consultations and the social & economical assessment.	
	The fourth year	6.4.1 Internal consultations with center and local authorities about NRP	
	The fourth year	6.4.2 Convene an international workshop to present to the audience the achievements of the project and the NRP. It will also serve as a fundraising opportunity and mobilize donor support for implementation of the National Replication Program.	
7 Project management			GEF Financing \$450,000 Co-financing \$900,000
7.1 strengthened institutional capacity for project management in MEP and three demonstration counties		7.1.1 Strengthen the capacity of National Project Team. In addition to the existing 3 staff, PT will recruit a coordinator and a secretary. 7.1.2 Establish CIU in each demonstration county furnished by staff and equipments 7.1.3 Develop Project Implementation Manual (PIM) 7.1.4 Train the staff of PT and CIUs about the PIM and relevant requirement of GEF and UNDP on project management	
7.2 Project implemented smoothly and all results specified achieved		7.2.1 Undertake routine project management activities to ensure the smooth and timely implementation of the project. The activities include but not limited to: drafting TORs, select and contract with consultants,	

Project Document for China dicofol project

		organize M&E activities, organize the review of substantial report		
--	--	--------------------------------------------------------------------------	--	--

To facilitate the implementation of the project and to ensure the smooth phase out of the production and consumption of DDT used as intermediate in the production of dicofol, the Foreign Economic Cooperation Office (FECO) of the Ministry of Environmental Protection (MEP), with the support of UNDP, has made great efforts to secure co-financing support from related stakeholders. FECO has received commitment letters for co-financing (US\$1,000,000) from the Ministry of Agriculture (MOA), the three demonstration counties (US\$3,900,000), and the enterprises that produce dicofol and alternatives (US\$1,300,000) to provide cash or in-kind co-financing to support the implementation of this project. Copy of the commitment letters is available at FECO. In addition, FECO pledges to provide additional support in cash and in-kind (US\$1,400,000) to support the implementation of this project.

Sample inquiry indicates that farmers will continue to cover the baseline costs of US\$900,000 to buy alternative acaricides and other materials instead of dicofol. In addition, they will also contribute an equivalent amount of US\$2,700,000 as the minimum inputs for increased labour costs on sanitary on IMP implementation and other activities such as planting grass or luring plants, making their total in-kind co-financing contribution as US\$3,600,000.

Furthermore, an equivalent amount of US\$450,000 will be supported by NGO/research institutes as in-kind contribution for capacity building and mobilization programme and monitoring activities. A total of US\$11,650,000 will be available as co-financing.

COMPONENT 5: WORK PLAN BUDGET SHEET

Detailed Breakdown of GEF and Co-Financing Budget and Work Plan

Part 1: Total Project Workplan and Budget under GEF Financing

Award ID:	00050191	Project ID:	00061862								
Project Title	Improvement of DDT based Production of Dicofol and Introduction of Alternative Technologies Including IPM for Leaf Mites Control in China										
Executing Agency	Ministry of Environmental Protection (MEP)										
Planned Budget											
GEF Outcome / Atlas Activity*	Responsible Party	Source of Funds	Atlas Code	Atlas Budget Description	Amount (USD) 2008	Amount (USD) 2009	Amount (USD) 2010	Amount (USD) 2011	Amount (USD) 2012	Total (USD) 2008 - 2012	
Component 1: Capacity building and policy making	MEP	GEF	71200	International Consultant							
			71300	National Consultant	14,850	40,500	18,900	8,100	4,050	86,400	
			71400	Contractual Service							
			71600	Travel	800	1,600	1,600	1,600	800	6,400	
			72100	Subcontract	33,100	73,250	46,900	32,600	12,550	198,400	
			72200	Equipment							
			72400	Communication	52	105	105	105	53	420	
			74100	Professional Services	1,000	2,000	2,000	2,000	1,000	8,000	
			74500	Miscellaneous	48	95	95	95	47	380	
				Sub-total			49,850	117,550	69,600	44,500	18,500
Component 2: Implementation of IPM demonstration program	MEP	GEF	71200	International Consultant	15,375	30,750	30,750	30,750	15,375	123,000	
			71300	National Consultant	3,425	20,350	33,850	33,850	3,425	94,900	
			71400	Contractual Service							
			71600	Travel							
			72100	Subcontract	323,795	1,136,995	941,865	638,195	241,250	3,282,100	
			72200	Equipment							
			72400	Communication							
			74100	Professional Services							
			74500	Miscellaneous							
							342,595	1,188,095	1,006,465	702,795	260,050

Project Document for China dicofol project

Component 3: Closure of non-closed dicofol production plants	MEP	GEF	71200	International Consultant	0	10,000	10,000	5,000	0	25,000	
			71300	National Consultant							
			71400	Contractual Service							
			71600	Travel							
			72100	Subcontract	27,350	706,530	171,120	0	0	905,000	
			72200	Equipment							
			72400	Communication							
			74100	Professional Services							
			74500	Miscellaneous							
			Sub-total	27,350	716,530	181,120	5,000	0	930,000		
Component 4: Optimization of existing closed-system dicofol production	MEP	GEF	71200	International Consultant							
			71300	National Consultant							
			71400	Contractual Service							
			71600	Travel							
			72100	Subcontract	19,640	101,550	61,390	43,710	43,710	270,000	
			72200	Equipment							
			72400	Communication							
			74100	Professional Services							
			74500	Miscellaneous							
			Sub-total	19,640	101,550	61,390	43,710	43,710	270,000		
Component 5: Monitoring and evaluation plan	MEP	GEF	71200	International Consultant					17,600	17,600	
			71300	National Consultant			3,700		3,700	7,400	
			71400	Contractual Service							
			71600	Travel							
			72100	Subcontract	37,500	47,500	47,500	43,500	46,000	222,000	
			72200	Equipment							
			72400	Communication							
			74100	Professional Services							
			74500	Miscellaneous	0	750	750	750	750	3,000	

Project Document for China dicofol project

		Sub-total		37,500	48,250	51,950	44,250	68,050	250,000
Component 6: Preparation of the National replication program	71200	International Consultant							
	71300	National Consultant							
	71400	Contractual Service							
	71600	Travel							
	72100	Subcontract	0	100,000	125,000	75,000	0	300,000	
	72200	Equipment							
	72400	Communication							
	74100	Professional Services							
	74500	Miscellaneous							
		Sub-total		0	100,000	125,000	75,000	0	300,000
Component 7: Project management	71200	International Consultant							
	71300	National Consultant		61,200	43,350	43,350	21,675	209,100	
	71400	Contractual Service							
	71600	Travel		16,550	16,550	16,550	8,274	66,199	
	72100	Subcontract							
	72200	Equipment		37375	37375	37375	18,688	149,501	
	72400	Communication		6,000	6,000	6,000	3,000	24,000	
	74100	Professional Services							
	74500	Miscellaneous		600	0	0	0	1,200	
		Sub-total		70,088	103,275	103,275	103,275	51,637	450,000
Total GEF allocation			547,023	1,598,800	1,018,530	441,947	6,000,000		

Part 2: Total Project Workplan and Budget Reflecting GEF Resources and Co-Financing Based on Activities

Project Activities		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total	GEF	Co-financing
Component 1: Capacity building and policy making									
Act 1.1	Strengthened coordination mechanism for DDT phase-out in both country-level and demonstration areas						160,000	50,000	110,000
Act 1.2	Improved institutional capacity for IPM promotion, application, mite and residues monitoring						503,000	173,000	330,000
Act 1.3	Strengthened capacity for ESM of POPs stockpiles and wastes						92,000	32,000	60,000
Act 1.4	Improved capacity for policy enforcement						98,000	38,000	60,000
Act 1.5	Reinforced policy framework for DDT and dicofol reduction						47,000	7,000	40,000
	Sub-total						900,000	300,000	600,000
Component 2: Implementation of IPM demonstration program									
Act 2.1	IPM demonstration program developed and updated						95,100	95,100	0
Act 2.2	IPM Operational Manual developed						522,800	297,800	225,000
Act 2.3	Technicians and farmers trained						1,400,700	590,700	810,000
Act 2.4	IPM implementation and dicofol use in demonstration areas eliminated						9,098,400	1,896,400	7,202,000
Act 2.5	Public awareness of IPM and Stockholm Convention raised						374,000	347,000	27,000
Act 2.6	Manufactures and research institutes motivated to improve alternatives that are more environmental friendly and cost-effective						309,000	273,000	36,000
	Sub-total						11,800,000	3,500,000	8,300,000
Component 3: Non-closed-system dicofol production facilities closed down									
Act 3.1	Non-closed dicofol production facilities closed down						984,850	188,850	796,000
Act 3.2	abandoned facilities and wastes cleaned up						810,000	703,000	107,000
Act 3.3	Risk assessment of the waste production sites conducted and Institutional control measures developed						135,150	38,150	97,000
	Sub-total						1,930,000	930,000	1,000,000

Project Document for China dicofol project

Project Activities		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total	GEF	Co-financing
Component 4: Optimization of existing closed-system dicofol production									
Act 4.1	Optimizing existing closed-system dicofol production to minimize the DDT release						109,300	38,400	70,900
Act 4.2	Develop and carry out periodical monitoring and inspection plans						460,700	231,600	229,100
	Sub-total						570,000	270,000	300,000
Component 5: Monitoring and evaluation plan									
Act 5.1	M&E plan with annual and terminal reviews/audits developed and conducted						385,000	200,000	185,000
Act 5.2	MIS developed and sustainability maintained						80,000	40,000	40,000
Act 5.3	Impacts of social, environmental and human health assessed						35,000	10,000	25,000
	Sub-total						500,000	250,000	250,000
Component 6: Preparation of the national replication program									
Act 6.1	Effectiveness of sustainable alternatives verified						70,000	30,000	40,000
Act 6.2	Project experiences summarized for dissemination						60,000	30,000	30,000
Act 6.3	National Replication Program (NRP) developed						350,000	190,000	160,000
Act 6.4	Stakeholder including NGO and private sectors for NPR implementation motivated						120,000	50,000	70,000
	Sub-total						600,000	300,000	300,000
Component 7: Project management									
Act 7.1	strengthened institutional capacity for project management in SEPA and three demonstration counties						1,320,000	420,000	900,000
Act 7.2	Project implemented smoothly and all results specified achieved						30,000	30,000	0
	Sub-total						1,350,000	450,000	900,000
	Project Total						17,650,000	6,000,000	11,650,000

Project Document for China dicofol project

To ensure smooth and efficient implementation of the project under the arrangement of national execution modality agreed between UNDP and CIO of FECO/MEP, major component of the project activities will be implemented with the support of qualified technical national and international experts and institutes, to be engaged through contractual agreements (subcontracts) by FECO/MEP with the qualified individual experts or institutions, as appropriate and applicable in accordance with established financial rules and regulations, through competitive bidding process. Such contractual agreements will be a more effective and simplified mechanism that will enable efficient supervision and monitoring by FECO/MEP and UNDP to assure the timely delivery of anticipated results. Furthermore, the subcontract arrangements will also afford better financial management as payments will only be effected on agreed deliverables and upon satisfactory completion of the tasks stipulated in the subcontract. The table below highlights the major subcontracts to be awarded under each of the project component:

Description of subcontract	Total budget (USD)	GEF (USD)	Co-financing (USD)	Indicative Activities/Outputs of the subcontracts
Component 1: Capacity building and policy making				
Subcontract 1: Strengthen National Steering Group	40,000	20,000	20,000	NSG established and meets at least once every half year throughout the project to facilitate smooth project implementation
Subcontract 2: Strengthen County-level Steering Group	89,600	14,800	74,800	CSG established and meets once every quarter in each of the three demonstration counties to facilitate smooth project implementation
Subcontract 3: Strengthen the capacities for IPM promotion	132,600	22,200	110,400	Strengthen the capacities for IPM promotion in three county centers by training of the staff (around 30) and complement with necessary equipment for successful introduction of IPM technology
Subcontract 4: Strengthen the capacities for pesticide residues monitoring	115,600	26,800	88,800	Strengthen the capacities for pesticide residues monitoring in one center in each demonstration county by training staff, complementing with necessary equipment and reinforcing the operation rules to achieve effective monitoring.
Subcontract 5: Strengthen the systemic capacities of mite monitoring	157,600	37,600	120,000	Strengthen the systemic capacities of mite monitoring in the demonstration counties by training staff, complementing with necessary equipment and reinforcing the operation rules to achieve effective monitoring.
Subcontract 6: Strengthen the capacity on waste management	92,000	32,000	60,000	Train local EPB and Solid Waste Management centre to strengthen the capacity on waste management (training materials) to facilitate effective management.
Subcontract 7: Improve capacity for policy enforcement	98,000	38,000	60,000	1) Train staff from local environmental monitoring station and technicians from the dicofol production plants on DDT monitoring. 2) Organize on-site supervision and oversight.
Subcontract 8: Reinforce policy framework	47,000	7,000	40,000	Reinforced policy framework for DDT and dicofol reduction to ensure compliance.
Sub-total	772,400	198,400	574,000	
Component 2: Implementation of IPM demonstration program				
Subcontract 1: Develop and update IPM demonstration program	163,800	163,800	0	1) Learn the requirement of the project and carry out on-site situation investigation regarding IPM program implementation in three demonstration areas;

Project Document for China dicofol project

<p>Subcontract 2: Develop IPM Operational Manual for Apple</p>	<p>35,000</p>	<p>35,000</p>	<p>0</p>	<p>2) Develop a detailed and annual-based IPM program for mite control for apply, citrus and cotton, respectively. 3) Compile assessment plan and evaluate the implementation of this IPM program and updated annually or as appropriately based on the problems that might occurring during implementation, to the lessons and experiences from previous years and the latest technologies in the world. 4) Carry out consultations with relevant stakeholders such as involving administration departments and local governments, for the development of the integrated and annual IPM program.</p>
<p>Subcontract 3: Develop IPM Operational Manual for citrus</p>	<p>35,000</p>	<p>35,000</p>	<p>0</p>	<p>1) Investigate domestic and international IPM operational experience regarding apple planting; 2) Develop IPM Operational Manual for mite control in apple to tell farmers when and how to use IPM technologies step by step. The content of the Manual has to include at least pest identification, mite behavior, mite occurrence with climate and crop growth, economic thresholds, monitoring technologies, mite resistance, acaricide selection, IPM technologies. The theoretical knowledge will be expressed in simple and easy language which can be understood by farmers. 3) Carry out consultation with relevant experts, local technicians for apple planting and farms before finalization of the Manual; Key Outputs will be an IPM Operational Manual and training material for Apple</p>
<p>Subcontract 4: Develop IPM Operational Manual for cotton</p>	<p>32,500</p>	<p>32,500</p>	<p>0</p>	<p>1) Investigate domestic and international IPM operational experience regarding citrus planting; 2) Develop IPM Operational Manual for mite control in citrus to tell farmers when and how to use IPM technologies step by step. The content of the Manual has to include at least pest identification, mite behavior, mite occurrence with climate and crop growth, economic thresholds, monitoring technologies, mite resistance, acaricide selection, IPM technologies. The theoretical knowledge will be expressed in simple and easy language which can be understood by farmers. 3) Carry out consultation with relevant experts, local technicians for citrus planting and farms before finalization of the Manual; Key Outputs will be an IPM Operational Manual and training material for Citrus</p>

Project Document for China dicofol project

<p>Subcontract 5-7 Training of trainers for apple, citrus and cottons, respectively</p>	<p>3 x 116,900 = 350,700</p>	<p>350,700</p>	<p>0</p>	<p>planting and farms before finalization of the Manual; Key Outputs will be an IPM Operational Manual and training material for cotton</p> <p>1) Work together with the local governments to select qualified technicians from representative townships. The selected technicians will be future trainers. The trainers may include extension workers in plant protection in county and township and technical leaders of farmers. 2) Train at least 80 trainers each as the first level training for cotton, apple and citrus on how to use the IPM Operational Manuals; 3) The planned training for trainers will be conducted once a year. The training course will last three days for the first year with both in room and in field training. Exams will be held by the end of the training courses and certificates will be awarded to the trainers who pass the training courses. 4) Communication between the trainers and experts will be conducted in scheduled period in the 2nd and the 3rd year. The communication will be scheduled for one day. Key outputs will be 240 trainers and key technicians trainer, e.g. 80 for apple, 80 for citrus and 80 for cotton, that are well trained with the latest requirement of IPM operation</p>
<p>Subcontract 8: Demonstration of apple IPM technologies</p>	<p>2,917,633</p>	<p>406,933</p>	<p>2,510,700</p>	<p>This subcontract will be implemented by CIU.</p> <p>1) Select demonstration townships and demonstration areas. 10,000 hectares will be selected for the demonstration of IPM technologies. 2) Print 30,000 copies IPM Operation Manual and carry out the training of farmers. The training will combine in-house and in-field training. Farmers in-field training includes mainly the training from the trainers to farmers. Based on the season, it is estimated that eight times training courses will be carried out for each crops scheduled March, April, May, June, July, August, September to October and November. There will be participation, development, inter-action, and face-to-face training for the farmers. 3) Organize technicians for the pests diagnosing, scouting and monitoring; 4) Promulgate the pest occurrence information for the demonstration farmers regularly; 5) Organize the farmers to follow requirements of the IPM Operational Manual and apply the IPM technologies for apple planting, such as plant grass, releasing predatory mite, Pheromone, attracting lights, yellow board; 6) Conduct survey on the efficacy, quality and yield result record of the demonstration; 7) Conduct the market supervision and management of dicofol; 8) Conduct local dissemination through local TVs, newspapers and posters; 9) Provide progress report quarterly.</p> <p>Key Outputs will include:</p>

Project Document for China dicofol project

<p>Subcontract 9: demonstration of citrus IPM technologies</p>	<p>2,904,133</p>	<p>406,933</p>	<p>2,497,200</p>	<p>1) 10,000 hectares apple will be demonstrated for the IPM technologies; 2) Totally 30,000 farmers trained by trainers according to IPM Operational Manuals. 3) Farmers in demonstration regions accept and implement IPM technologies appropriately after training. 4) 36 pest occurrence information for the demonstration farmers collected regularly; 5) Integrated report on the survey on the efficacy, quality and yield result record of demonstration; 6) Local public awareness raising conducted; 7) Quarter progress report prepared.</p>
				<p>This subcontract will be implemented by CIU. 1) Select demonstration townships and demonstration areas. 10,000 hectares will be selected for the demonstration of IPM technologies. It should be make sure that the farmers and technicians to be involved in the demonstration have to participate in the designed IPM training courses; 2) Print 30,000 copies IPM Operation Manual and carry out the training of farmers. The training will combine in-house and in-field training. Farmer in-field training includes mainly the training from the trainers to farmers. Based on the season, it is estimated that training courses will be carried out eight times for each crops scheduled March, April, May, June, July, August, September to October and November. There will be participation, development, inter-action, and face-to-face training for the farmers. 3) Organize technicians for the pests diagnosing, scouting and monitoring; 4) Promulgating the pest occurrence information for the demonstration farmers regularly; 5) Organize the farmers to follow requirements of the IPM Operational Manual and apply the IPM technologies for citrus planting, such as plant grass, Releasing predatory mite, Pheromone, attracting lights, yellow board; 6) Conduct the survey on the efficacy, quality and yield result record of demonstration; 7) Conduct the market supervision and management of dicofol; 8) Conduct local dissemination through local TVs, newspapers and posters; 9) Provide progress report quarterly.</p> <p>Key Outputs: 1) 10,000 hectares citrus will be demonstrated for the IPM technologies; 2) Totally 30,000 farmers trained by trainers according to IPM Operational Manuals. 3) Farmers in demonstration regions accept and implement IPM technologies appropriately after training. 4) 36 pest occurrence information for the demonstration farmers collected regularly;</p>

Project Document for China dicofol project

<p>Subcontract 10: Demonstration of cotton IPM technologies</p>	<p>3,070,034</p>	<p>324,434</p>	<p>2,745,600</p>	<p>5) Integrated report on the survey on efficacy, quality and yield result record of demonstration; 6) Local public awareness raising conducted; 7) Quarter progress report prepared.</p> <p>This subcontract will be implemented by CIU.</p> <p>1) Select demonstration townships and demonstration areas. 10,000 hectare cotton will be selected for the demonstration of IPM technologies. It should be make sure that the farmers and technicians to be involved in the demonstration have to be participated in the designed IPM training courses;</p> <p>2) Print 30,000 copies IPM Operation Manual and carry out the training of farmers. The training will combine in-house and in-field training. Farmer in-field training includes mainly the training from the trainers to farmers. Based on the season, it is estimated that training courses will be carried out eight times for each crops scheduled March, April, May, June, July, August, September to October and November. There will be participation, development, inter-action, and face-to-face training for the farmers.</p> <p>3) Organize technicians for the pests diagnosing, scouting and monitoring;</p> <p>4) Promulgate the pest occurrence information for the demonstration farmers regularly;</p> <p>5) Organize the farms to follow requirements of the IPM Operational Manual and apply the IPM technologies for cotton planting, such as such as sanitary for cotton, winter plough and water the field, planting luring plants etc;</p> <p>6) Conduct survey on the efficacy, quality and yield result record of demonstration;</p> <p>7) Conduct the market supervision and management of dicofol;</p> <p>8) Conduct local dissemination through local TV's, newspapers and posters;</p> <p>9) Provide progress report quarterly.</p> <p>Key Outputs: 1) 10,000 hectares cotton will be demonstrated for the IPM technologies; 2) Totally 30,000 farmers trained by trainers according to IPM Operational Manuals. 3) Farmers in demonstration regions accept and implement IPM technologies appropriately after training. 4) 36 pest occurrence information for the demonstration farmers collected regularly; 5) Integrated report on the survey on the efficacy, quality and yield result record of demonstration; 6) Local public awareness raising conducted; 7) Quarter progress report.</p>
<p>Subcontract 11: Meetings for on site technology information exchange</p>	<p>3 x 40,000= 120,000</p>	<p>120,000</p>	<p>0</p>	<p>Convene key official and technicians from three demonstration areas together once per year to exchange experiences and lessons on IPM demonstration.</p>

Project Document for China dicofol project

<p>Subcontract 12: Procurement of dicofol alternatives</p>	<p>922,000</p>	<p>506,000</p>	<p>416,000</p>	<p>Key Activities: 1) Prepare bidding document for the procurement of alternatives of dicofol in the consideration of the basic requirements of the alternatives, such as high efficacy, low toxic and environmental friendly chemical or non-chemical alternatives. Alternatives have to be registered for mite control for apple, citrus and cotton in China; 2) Carry out bidding process; 3) Select and procure the dicofol alternatives according to the bidding results; 4) Transport the alternatives to the demonstration areas for applications. Outputs: High quality alternatives procured with low cost. 1) Prepare the specification and bidding document for procurement of tractor for cotton demonstration. 2) Carry out bidding process; 3) Select and procure the tractors according to the bidding results; 4) Transport the tractors to the demonstration areas for applications. 10 tractors will be purchased at low cost.</p>
<p>Subcontract 13: Procurement of tractor</p>	<p>100,000</p>	<p>100,000</p>	<p>0</p>	<p>1) Prepare the specification and bidding document for procurement of tractor for cotton demonstration. 2) Carry out bidding process; 3) Select and procure the tractors according to the bidding results; 4) Transport the tractors to the demonstration areas for applications. 10 tractors will be purchased at low cost.</p>
<p>Subcontract 14: DDT sampling and analysis in soil</p>	<p>90,400</p>	<p>90,400</p>	<p>0</p>	<p>Sample and analyze DDT residue in soil and products periodically; It is estimated that 120 samples will be analyzed. Reports on sampling and analysis will be produced.</p>
<p>Subcontract 15: Dicofol sampling and analysis in crops during the crop growth season</p>	<p>90,400</p>	<p>90,400</p>	<p>0</p>	<p>Sample and analyze dicofol content in crops during the crop growth and pesticide application season as a measure to check if the pesticide containing dicofol is still being used. It is estimated that 120 samples will be analyzed.</p>
<p>Subcontract 16: Conduct public awareness activities</p>	<p>374,000</p>	<p>347,000</p>	<p>27,000</p>	<p>1. Compiling dissemination materials in terms of official, manufactures and dealers of pesticide, farmers, dealers and consumers of agriculture end-products to promote understand the potential risk of dicofol and DDT, and to reject the use directly or indirectly of dicofol and DDT related products. 2. Conduct public awareness activities via various approaches, e.g., broadcast, television, mobile, hot line, newspaper, post, etc. Key outputs will include: 1. One TV program for the dissemination IPM technology; 2. One TV program for the dissemination of knowledge on POPs Convention and significance of phasing out dicofol; 3. The video dissemination program will be broadcasted on TV for three times for each demonstration country; 4. Nine papers for dissemination of IPM technology and significance of phasing out POPs will be done in local or regional newspapers; 5. 90,000 T-shirt for dissemination of dicofol alternatives will be produced and distributed;</p>

Project Document for China dicofol project

					6. 4,500 posters for dissemination of dicofol alternatives and significance of phasing out POPs will be produced and distributed.
Subcontract 17: Develop motivated plan	50,000	50,000	0		1. Draft a plan for the promotion of R&D and production of the alternatives; 2. Convene a mobilization meeting to attract the participation of enterprises.
Subcontract 18: Implement motivated plan	259,000	223,000	36,000		1) Assess and select the alternatives of the participation enterprises; 2) Carry out pilot planting with the selected alternatives and collect data for the assessment of economic feasibility, effectiveness and impact of these alternatives. The pilot planting will last two years. 3) Disseminate the result of the assessments and recommend the best alternatives to the farms.
Sub-total	11,514,600	3,282,100	8,232,500		
Component 3: Closure of non-closed dicofol production plants					
Subcontract 1 : Develop action plan and guidelines for clean-up	79,300	79,300	0		Develop two technical guidelines and an action plan to cover the entire spectrum of activities to constitute the Environmentally Sound management (ESM) of DDT contaminated sites and disposal of hazardous wastes containing DDT. Guidelines and action plan used for the closure of dicofol production-line at Zhajiakou and Dacheng
Subcontract 2 : Cleanup Training Module	76,750	76,750	0		1) Develop training module on waste cleanup 2) Conduct training courses for relevant stakeholders
Subcontract 3 : Coordination for the closure of the production	10,800	7,800	3,000		Conduct coordination meeting to promote and dissemination of prohibition instruction and labeling requirement
Subcontract 4 : Cleanup of contaminated facilities, workshop and wastes	810,000	703,000	107,000		1) develop the detailed implementation schedule for the POPs waste cleanup and monitoring for the 2 dicofol sites 2) Remove all the accumulated liquid POPs waste and residual as required 3) Safe storage of the collected POPs waste until transport to the designated disposal centre 4) Prepare the disposal report to record the major operation process, including the QA/QC implementation and M&E report from an independent monitoring agency. These activities will enable the contaminated facilities, workshop and wastes will be disposed with environmental friendly approaches, with appropriate protection and risk management for the workers.
Subcontract 5 : Site monitoring and environment risk assessment	135,150	38,150	97,000		1) Carry out risk assessment to the soil and underwater surrounding the obsolete production sites; 2) Develop the institutional control measures and facilitate the implementation of these measures. EIA report for the 2 dicofol production sites will be produced and institutional control measures suggested to ease the environmental impact on the two sites

Project Document for China dicofol project

Subcontract 6 : Site reuse	793,000	0	793,000	Build new production lines
Sub-total	1,905,000	905,000	1,000,000	
Component 4: Optimization of existing closed-system dicofol production				
Subcontract 1 : Improve operational rules and skills of production	109,300	38,400	70,900	1) Improve the operational rules and skills of Yangnong pesticide Co. Ltd closed-system dicofol production, in particular the rules and skills with regard to the management of the wastewater and the waste acid released from the dicofol production. 2) Train the official and workers on the improved rules.
Subcontract 2 : Independent supervision and monitoring of DDT release	226,300	130,400	95,900	1) Set up a framework on periodical supervision and monitoring of DDT in the workshop of dicofol production facility, the wastewater, the waste acid dicofol products. 2) Carry out independent monitoring of potential DDT release at least twice per year, for continuous inspection and verification of the eligibility of dicofol product in Yangnong Group.
Subcontract 3 Consultation with enterprise and local EPB	60,200	11,800	48,400	Consult with and secure agreement of the enterprise and local EPB on the framework on periodical supervision and monitoring of DDT.
Subcontract 4: Periodical monitoring of DDT	174,200	89,400	84,800	Periodical monitoring the product, wastewater, waste acid and other pollutants for DDT and other POPs to make sure the release of DDT could meet the requirements of the Convention and relevant domestic and international standards.
Sub-total	570,000	270,000	300,000	
Component 5: Monitoring and evaluation plan				
Subcontract 1: Inception of the project	45,000	30,000	15,000	Organize Inception Workshop (IW) and prepare Inception Report
Subcontract 2: Verify impact indicators	180,000	60,000	120,000	Verify impact indicators through field visits, questionnaires, interviews and monitoring as appropriate
Subcontract 3: Annual review	98,000	60,000	38,000	Prepare Annual Project Reports & conduct Project Implementation Reviews
Subcontract 4: Annual project financial audits	22,000	22,000	0	Conduct annual project financial audits
Subcontract 5: MIS	80,000	40,000	40,000	Develop and maintain MIS
Subcontract 6: Prepare Project Completion Report (PCR), with social and economic impact assessment	35,000	10,000	25,000	Prepare Project Completion Report (PCR), with social and economic impact assessment
Sub-total	460,000	222,000	238,000	
Component 6: Preparation of the National replication program				

Project Document for China dicofol project

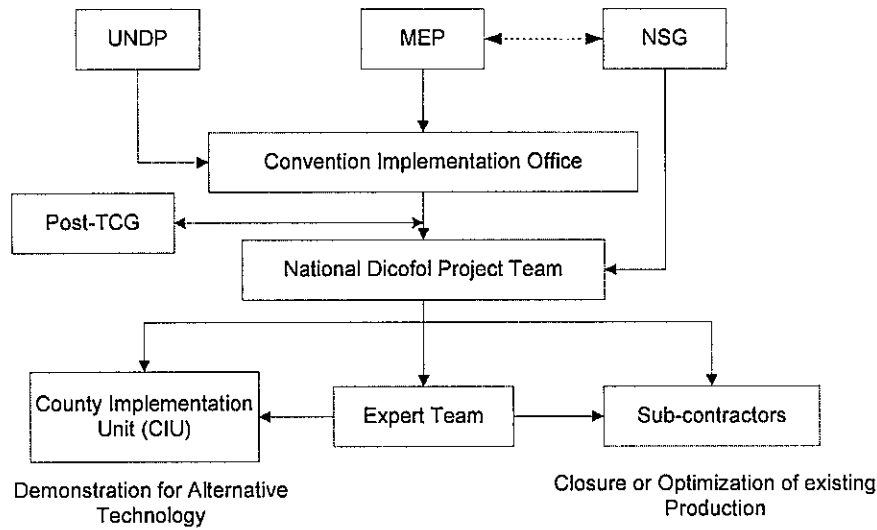
<p>Subcontract 1: Investigate baseline and develop National Replication Program (NRP)</p>	<p>540,000</p>	<p>250,000</p>	<p>290,000</p>	<ol style="list-style-type: none"> 1) Assess and verify effectiveness of the alternatives applied in the demonstration areas; 2) Summarize the lessons and experience in the demonstration areas, convene a two day technical workshop to discuss the main issues to be taken into consideration for preparation of the National Replication Program; 3) Carry out investigation on other areas of China about the consumption of dicofol and related management issues; 4) Hold three regional consultation meetings to discuss with local authorities and key stakeholders about the feasibility of the application of IPM-based alternatives for mite control; 5) Develop National Replication Program (NRP) based on the experiences in demonstration areas, the results of above investigation, consultations and the social and economical assessment
<p>Subcontract 2: Consultation activities</p>	<p>60,000</p>	<p>50,000</p>	<p>10,000</p>	<p>Convene a domestic consultation meeting and an international consultation meeting to present to the audience the achievements of the project and the NRP to facilitate stakeholders, including NGO and private sectors, will be motivated for NPR implementation</p>
<p>Sub-total</p>	<p>600,000</p>	<p>300,000</p>	<p>300,000</p>	

Project Document for China dicofol project

COMPONENT 6: MANAGEMENT ARRANGEMENTS

Project management arrangement

The project will be implemented under National Execution (NEX) modality and will involve a wide range of stakeholders. The roles and responsibilities of various stakeholders directly involved in project implementation are described as follows:



*Figure 1: Project Institutional Arrangement

- a. **MEP** (formerly State Environmental Protection Administration, SEPA), as the administrative authority on environmental protection, is designated by the State Council as the core agency for coordination of all POPs related activities in China and the focal point for the implementation of the POPs Convention in China. MEP is national implementing agency for this project. Its responsibilities will include (1) responsible for the project in general and ensure its successful implementation and quality; (2) to provide political direction and guidance to CIO; (3) coordination with stakeholders, including GEF, donors, IAs, and relevant domestic ministries and agencies, including the member commissions and ministries of the NCG.
- b. **National Steering Group (NSG)**. During the PPG phase, this project has established an Inter-ministerial Steering Group which comprises of MEP and Ministry of Agriculture (MOA) to provide overall guidance and coordination for the implementation of relevant activities and to ensure the committed inputs and contribution are available as needed. This NSG will be further expanded to cover other relevant departments such as NDRC and GAQSIQ. The Group will meet twice per year or as needed.
- c. **Convention Implementation Office (CIO)**. The CIO is an inter-departmental coordination unit of MEP and acts as the secretariat of the NCG. It is responsible for day-to-day compliance with the Stockholm Convention in China. CIO's responsibilities include: (i) provision of technical support for international negotiations and policy studies on the Stockholm Convention, (ii) provision of support to the development and implementation of corresponding policy and regulations, as well as coordination of key governmental stakeholders, (iii) mobilize co-financing for the project from bilateral and domestic governmental and private sources, (iv) collecting data and information,

Project Document for China dicofol project

compiling reports, organizing trainings, and publishing information. In this project, CIO will represent MEP to provide political guidance to the implementation of this project, coordinate with various stakeholders with post-TCG and other appropriate approaches, and to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost.

- d. **National Dicofol Project Team (PT).** The project team, composing of staff from MEP and Ministry of Agriculture (MOA), has been established within the CIO and is administratively managed by Foreign Economic Cooperation Office (FECO) of MEP, a professional office with more than 15 years experiences for the implementation of international environmental cooperation programs and for the follow-up implementation of international environmental conventions. In general, the team is responsible for the day-to-day management, coordination and implementation of the proposed project under the guidance of CIO and with the support of the consultants recruited. Its responsibilities include (i) to manage project procurement and financial resource in accordance with UNDP's procedures, prepare and amend as necessary the Annual Workplan and relevant progress and financial report; (ii) to organize and convene project coordination and review meeting, including the Annual Review Meeting and prepare Project Review Report; (iii) to prepare TORs under this project; (viii) to select and contract with individual consultants and sub-contractors, supervise the implementation of contractors to ensure the smooth implementation of the contracts; (v) to provide guidance to the local County Implementation Units (CIUs); and (ix) to organize the inspections and verifications to the project achievement.
- e. **Post-technical Coordination Group Meeting (Post-TCG).** During NIP development, CIO established a coordination mechanism for stakeholder involvement, called TCG. Relevant domestic stakeholders, international IAs and EAs, as well as potential bilateral donors, private sectors, NGOs etc. would be informed about the progress and further needs for Convention implementation, invited to advise on its design and encouraged to be involved and co-fund some of the activities. They would be briefed on the implementation progress and impacts at the TCG meetings. CIO will continue to convene TCG meetings at interval of around once per year. The coordination on the implementation of this project will be one of the important components of the TCG meetings.
- f. **County-level Steering Group.** In each demonstration county, a county-level steering group chaired by County Leader in charge and comprised of relevant departments, e.g. Agriculture Bureau, Environmental Bureau and other relevant agencies as necessary will be established to be responsible for the coordination and guidance for the implementation of the activities locally, to ensure the committed inputs and contribution are available as needed, and the policies proposed in the project could be developed, promulgated and enforced effectively. The Steering Group will meet semi-annually or as needed.
- g. **County Implementation Unit (CIU).** CIU is established affiliated CSG for routine management under this project. The staff of CIU will come from the member bureaus. The Units will be response for (i) organization of IPM implementation; (ii) supervision of local pesticides distributions and applications; (iii) organization of joint inspections to ensure the effective implementation of related regulations; and (iv) collection of information needed for M&E and preparation of the required progress reports.
- h. **Expert team.** Nine consultants will be engaged to provide technical support for the implementation of the project. (i) three international experts will be recruited in IPM field in terms of three crops to provide overall technical direction and guidance for the IPM implementation and transfer international experience to this project; (ii) eight national technical experts with experience and knowledge in planting these three crops will be recruited to work with the international experts and assist CIO and CIU for the IPM implementation; (iii) one international experts will recruited to contribute technical support and guidance for the destruction of POPs waste and site risk assessment

Project Document for China dicofol project

- i. **Sub-contractors:** Qualified subcontractors will be selected competitively to provide various consulting and engineering services needed for the project implementation, e.g., IPM Operation Manual development, National Replication Program development, MIS development and maintenance, clean-up waste and polluted facilities, risk assessment, etc.

Coordination with other related initiatives

MEP is the lead government agency to coordinate all POPs activities in China. Relevant domestic stakeholders, international IAs and EAs, as well as potential bilateral donors, private sectors, NGOs etc. will be informed about this project, invited to advise on its design and encouraged to be involved and co-fund some of the activities. They will be briefed on its implementation progress and impacts through a coordination mechanism established during NIP development. In addition, MEP will work closely with the Ministry of Agriculture, National Development and Reform Commission (NDRC) and relevant domestic associations and institutes to integrate the project into the relevant policies, programs and investments activities. Close consultation and cooperation with FAO will take place during final project design and expertise of FAO will be solicited to contribute to the successful implementation of the project, in particular the successful results from a FAO-IPM project implemented since the 1990's and a recent DANIDA-IPM funded project. Close coordination and linkage will also be instituted with the relevant initiatives, e.g., Sino-American cooperation, "Partnership on POPs Pesticides Management for Agricultural Production in Central Asia and Caucasus Countries" implemented by ADB. A separate project approved by GEF last year, and is also implemented by UNDP, to reduce and eliminate DDT used as additive in the production of antifouling paint. All these measures will ensure adequate and effective coordination as well as continuous information exchange among IAs, EAs, donors, and domestic stakeholders in China and to link to the broader national chemicals management agenda. This, in turn, will serve to support the GEF's strategic aim to promote sound management of chemicals, as well as the objectives of the Strategic Approach to International Chemicals Management (SAICM), adopted in February 2006. SAICM supports the achievement of the WSSD Johannesburg Plan of Implementation goal that seeks to ensure that, by the year 2020, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health.

COMPONENT 7: MONITORING AND EVALUATION

Project monitoring and evaluation (M&E) will be conducted in accordance with established GEF and UNDP procedures and will be provided by the project team and the UNDP Country Office (UNDP-CO) with support from UNDP-GEF. Table 1 below provides the simplified Performance and Impact Indicators for each expected outputs, along with their corresponding means of verification, time frame and responsible parties. These indicators will form the basis for the M&E system under this project.

Table 1 - Monitoring and Evaluation Indicators

Project Components	Expected Outputs	Performance and impact indicators	Means of verification	Time frame	Responsible Parties
1. Capacity building and policy making	• Strengthened coordination mechanism for DDT phase-out in both country-level and	• National Steering Group consisting of CIO, MOA and other key stakeholders established	Notification of the establishment of NSG Minutes of NSG meetings	Annually	Project Team (PT)

Project Document for China dicofol project

Project Components	Expected Outputs	Performance and impact indicators	Means of verification	Time frame	Responsible Parties
	demonstration areas;	<ul style="list-style-type: none"> • Meet at least once per year • Three county-level Steering groups established 	Notification of the establishment of CSG		Country Implementation Unit (CIU)
	• Improved institutional capacity for Integrated Pest Management (IPM) promotion, application, mite and residues monitoring	<ul style="list-style-type: none"> • Meet at least twice per year • One county center in each county for IPM promotion strengthened • One county center in each county for pesticide residues monitoring strengthened • Ten centers for mite monitoring in each county strengthened 	Minutes of CSG meeting	Semi-annually	CIU
	• Strengthened capacity for Environmental Sound Management (ESM) of POPs stockpiles and wastes	<ul style="list-style-type: none"> • One county center in each county for pesticide residues monitoring strengthened • Ten centers for mite monitoring in each county strengthened • 30 staff of relevant EPB and Solid Waste Management Centre trained on waste management; • 20 staff from relevant local environmental monitoring station, the technicians from the plants of Dicofol production trained on DDT monitoring 	progress report or M&E reports	Periodically	CIU
	• Improved capacity for policy enforcement	<ul style="list-style-type: none"> • 30 staff of relevant EPB and Solid Waste Management Centre trained on waste management; • 20 staff from relevant local environmental monitoring station, the technicians from the plants of Dicofol production trained on DDT monitoring • Around 60 officials of national, provincial and county trained 	progress report or M&E reports	Periodically	CIU
			Minutes of trainings	• 1 st year	PT
			Minutes of training	• 1 st year	

Project Document for China dicofol project

Project Components	Expected Outputs	Performance and impact indicators	Means of verification	Time frame	Responsible Parties
	<ul style="list-style-type: none"> Reinforced policy framework for DDT and dicofol reduction 	<ul style="list-style-type: none"> At least four times field and market supervisions organized 	Mission report	As needed	PT
		<ul style="list-style-type: none"> At least three times field supervisions organized 	Mission report	As needed	PT
		<ul style="list-style-type: none"> the enforcement requirement taken into routine tasks 	Mission report	As needed	PT
		<ul style="list-style-type: none"> Policies to ban the use of dicofol and to encourage alternatives in demonstration areas issued 	Issued policies	1st year	CIU
		<ul style="list-style-type: none"> Policy to close down the non-closed production facilities issued 	Issued policies	2 nd year	PT
		<ul style="list-style-type: none"> Policy to encourage R& D, production and application on alternatives 	Issued policies	3 rd year	PT
2. Implementation of IPM demonstration program	<ul style="list-style-type: none"> IPM demonstration program developed IPM Operational Manual developed Technicians and farmers trained IPM implementation and dicofol use in 	<ul style="list-style-type: none"> Implementation Plan for IPM program developed and updated Three IPM operational manuals and training material for the three demonstrated crops compiled 240 technicians trained with IPM operation (maybe several times) 90,000 farmers trained on operation of IPM continuous mite monitoring and forecast carried out to guide the 	<ul style="list-style-type: none"> Substantial reports Substantial reports Minutes of trainings Records of monitoring 	<ul style="list-style-type: none"> Annually or as needed First year First year Every year Every year 30000 mu for each crop in first year. 	<ul style="list-style-type: none"> PT PT PT PT CIU CIUs with the assistance of PT

Project Document for China dicofol project

Project Components	Expected Outputs	Performance and impact indicators	Means of verification	Time frame	Responsible Parties
	<ul style="list-style-type: none"> demonstration areas eliminated Public awareness of IPM and Stockholm Convention raised Manufactures and research institutes motivated to improve alternatives that are more environmental friendly and cost-effective 	<ul style="list-style-type: none"> application of the pesticide 150,000 mu (1 hectare = 15 mu) demonstrated by IPM no dicofol use in demonstration counties IPM impacts evaluated public awareness for around 300,000 people At least 10 alternatives are tested and certificate and labels granted to the qualified products 	<ul style="list-style-type: none"> Progress report Report on evaluation Market and on-site inspections dissemination materials and progress report Test Reports Questionnaires 	<ul style="list-style-type: none"> 60000 mu for each crop in second year 60000 mu for each crop in third year Among, 1500 mu for apple and citrus each year will apply predatory mites scheme. Throughout the project The first and second year 	<ul style="list-style-type: none"> CIUs with the assistance of PT PT
3. Closure of non-closed dicofol production plants	<ul style="list-style-type: none"> 2,800 MT/a DDT production and consumption eliminated Discharge of 1,000 MT/a waste containing DDT reduced correspondingly Approximate 170 MT/a 	<ul style="list-style-type: none"> Non-closed dicofol production closed Relevant workers compensated or resettled (supported by co-financing) 	<ul style="list-style-type: none"> Commitment letters from the production plants Inspection report 	<ul style="list-style-type: none"> Upon approval of the project At least twice 	Owners of plants

Project Document for China dicofol project

Project Components	Expected Outputs	Performance and impact indicators	Means of verification	Time frame	Responsible Parties
	<p>DDT released to environment via the use of dicofol products with DDT impurity reduced</p> <ul style="list-style-type: none"> • Non-closed-system dicofol production facilities closed down and relevant workers compensated or resettled • Risk assessment of the waste production sites conducted; • Institutional control measures developed and implemented • Clean-up of waste facilities and contaminated sites carried out as needed 	<ul style="list-style-type: none"> • 700 MT previously accumulated DDT containing wastes cleaned up • Risk assessment on two dicofol production sites to be closed down carried out • Institutional control measure developed and circulated • Measures for preventing and mitigating the potential environmental and health risks that arise from clean-up and disposal operation will be taken and acted on 	<ul style="list-style-type: none"> • Certificates from disposal companies or local EPB • Substantial report on risk assessment 	<ul style="list-style-type: none"> • Second year • Second year 	<p>PT and relevant authorities</p> <p>PT and relevant authorities</p>
4. Optimization of existing closed-system dicofol production	<ul style="list-style-type: none"> • Optimization of existing closed-system dicofol production 	<ul style="list-style-type: none"> • The program for optimization of existing closed-system developed • Operational regulation developed and continuously implemented 	<ul style="list-style-type: none"> • Substantial report • Substantial report 	<ul style="list-style-type: none"> • First year and later 	<ul style="list-style-type: none"> • PT

Project Document for China dicofol project

Project Components	Expected Outputs	Performance and impact indicators	Means of verification	Time frame	Responsible Parties
	<ul style="list-style-type: none"> Develop and carry out periodical monitoring and inspection plans. <p>Discharge of 350 MT/a waste containing DDT minimized;</p> <p>Approximately 180 MT/a DDT released to environment via the use of dicofol products with DDT impurity minimized</p>	<ul style="list-style-type: none"> Training of the worker (20 people) on optimized operation carried out Framework on periodical supervision and monitoring of DDT developed Agreement among stakeholders on framework on periodical supervision and monitoring of DDT Periodical monitoring to DDT residual of the dicofol carried out each batch of the products The monitoring to the potential release of unintentional produced DDT carried out Independent monitoring carried out at least twice per year. 	<ul style="list-style-type: none"> Minutes of training Substantial report Minutes of consultation meetings Monitoring reports Monitoring reports And inspection reports 	<p>First year</p> <p>Second year</p> <p>Quarterly</p> <p>Semi-annually</p>	<p>PT</p> <p>PT</p> <p>Own of plant</p> <p>PT</p>
5. Monitoring and evaluation plan	<ul style="list-style-type: none"> M&E plan with annual and terminal reviews/audits developed and conducted MIS developed and sustainably maintained Impacts of social, 	<p>M&E activities carried out as scheduled</p> <p>Computerized MIS developed and maintained</p> <p>Impacts assessed</p>	<ul style="list-style-type: none"> Various M&E reports Progress report Substantial report 	<p>As schedule</p> <p>First year and later</p> <p>Fourth year</p>	<ul style="list-style-type: none"> PT PT PT

Project Document for China dicofol project

Project Components	Expected Outputs	Performance and impact indicators	Means of verification	Time frame	Responsible Parties
	environmental and human health assessed				
6. Preparation of the national replication program	• Effectiveness of sustainable alternatives verified	• The achievements and experiences in the other areas collected and assessed	Substantial report	Fourth year	PT
	• Project experiences summarized for dissemination	The lessons and experience in the demonstration areas summarized and circulated	• Substantial report • Minutes of consultation meeting	Fourth year	PT
	• National Replication Program (NRP) developed	• The status of the application of dicofol in other areas of China investigated and assessed • National Replication Program developed • More than two stakeholder involvement activities with more than 50 participants held	• Substantial report • Substantial report • Questionnaire and Survey reports	Fourth year	PT
	• Stakeholder including NGO and private sectors for NPR implementation motivated	• NRP consulted and circulated	• Minutes with questionnaire and Survey reports • Reports of the workshop	4 th year	• PT

M&E activity

The Ministry of Environment (MEP), formerly SPEA, as the national implementing agency, will designate the National Dicofol Project Team (PT) to be responsible for the organization of the M&E activities as stated in Table 2.

Project Document for China dicofol project

Table 2 - Indicative Monitoring and Evaluation Work plan and Corresponding Budget

Type of M&E activity	Responsible Parties	Budget GEF	Budget Co-financing	Budget US\$ <i>(Excluding project team Staff time)</i>	Time frame
Initiate the project by Inception Workshop (IW)	Project Team (PT)	30,000	15,000	45,000	Within first six months of commencement of project
Verify impact indicators by field visits, questionnaires, interviews and monitoring as appropriate	PT	60,000	120,000	180,000	Annually, before Annual Review Meeting (ARM)
Develop and maintain the computerized MIS	PT	40,000	40,000	80,000	Established in 1 st year
Prepare Annual Project Reports (APR) and Project Implementation Reviews (PIR)	PT in collaboration with UNDP CO	20,000	40,000	60,000	Annually, before ARM
Convene Annual Review Meetings	PT in collaboration with UNDP CO	40,000	10,000	50,000	Annually
Prepare Minutes for Annual Review Meetings	UNDP CO	0	0	0	Two weeks after meeting
Carry out mid-term and final external evaluation	External Consultants	25,000		25,000	Mid and End of the project
Prepare Project Completion Report (PCR), with social and economic impact assessment	PT	10,000	25,000	35,000	Two month after project completion
Carry out annual project financial audits	Independent Audit Entity	25,000		25,000	Annually
TOTAL indicative COST <i>Excluding expenses of PT and UNDP</i>		250,000	250,000	500,000	

Project Inception Phase

A Project Inception Workshop (IW) will be conducted to inform the key stakeholders the goal, objectives and management arrangement of the project, mobilize them to actively participate in the implementation of this project. The first annual work plan, along with M&E plan, with concise and measurable performance indicators and in a manner consistent with the expected outcomes of the project, will be discussed and finalized. Additionally, a detailed overview of UNDP-GEF reporting and M&E requirements, with particular emphasis on the Annual Project Implementation Reviews (PIRs) and related documentation, the Annual Project Report (APR), Annual Review Meetings, audited annual financial

Project Document for China dicofol project

statements, as well as independent evaluations will be presented in the workshop. PT will prepare the Inception Report to summarize the outputs and achievement of the workshop.

Verify performance indicators

During the implementation of the project, PT, in collaboration with UNDP CO and with assistance by the CIUs, will organize the activities for performance indicators via the means as elaborated in Table x Monitoring and Evaluation Indicators. Detailed M&E schedule will be developed simultaneously with and as part of the Annual Work Plan.

UNDP-CO and UNDP-GEF RCU as appropriate, will conduct yearly visits or more often based on an agreed upon schedule to be detailed in the project's Inception Report / Annual Work Plan.

Management Information System (MIS)

The project will establish a computerized MIS to track the progress of the project and facilitate its monitoring and evaluation, particularly in respect to IPM demonstration. PT will be responsible for the development of the MIS and will collect and consolidate the data, enter them into the MIS and generate quarterly reports to the project team.

Prepare Project Completion Report (PCR)

Prepare Project Completion Report (PCR) will be prepared by the end of the project to elaborate the progress and results achieved, to evaluate the status of the achievement regarding indicators. The lessons and experiences learned from the implementation of this project, pertaining social and economic impact would be summarized in this report.

COMPONENT 8: LEGAL CONTEXT

This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement (SBAA) between the Government of the People's Republic of China and the United Nations Development Programme, signed by the parties on 29 June 1979. The host country implementing agency shall, for the purpose of the Standard Basic Assistance Agreement, refer to the government co-operating agency described in that Agreement.

The UNDP Resident Representative in China is authorized to effect in writing the following types of revision to this Project Document, provided that he/she has verified the agreement thereto by the UNDP-GEF and is assured that the other signatories to the Project Document have no objection to the proposed changes:

- a) Revision of, or addition to, any of the annexes to the Project Document;
- b) Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation;
- c) Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility; and
- d) Inclusion of additional annexes and attachments only as set out here in this Project Document.

COMPONENT 9: ANNEXES

- I. National institutional and legal framework
- II. Program for IPM Demonstration
- III. Program for Closure of non-closed dicofol production plants
- IV. Program for Optimization of existing closed-system dicofol production

Project Document for China dicofol project

Annex I

National Institutional and Legal Framework

Institutional structure

According to regulations in the Regulation of Pesticide Management issued by State Council of PRC, pesticide including Dicofol production and application has applied “3-certificate” system, i.e. Register Certificate of Pesticide, Production License or Certificate of Approval for Pesticide Production and Production Quality Standard System. Pesticide production (including chemical production, preparation processing and packaging) must be registered. Any enterprise and individual could not produce, operate, import or apply pesticides which do not have Register Certificate of Pesticide and Production License of Pesticide. Pesticide manufacturers should produce according to quality standard and technical specifications for pesticide products. Quality standards for domestic pesticide products include national quality standards, industrial quality standards and enterprise quality standards.

According to the Regulation of Pesticide Management and so on, Ministry of Agriculture of PRC has restricted/eliminated production and application of 9 POPs pesticides, of which, aldrin, dieldrin, endrin, heptachlor and dechlorane do not have register of pesticide approved by Ministry of Agriculture of PRC and are forbidden to produce and apply. Register of pesticide of octachlorocamphene and Chlordane was cancelled in 1996. They are also forbidden to produce and apply. Hexachlorobenzene has not applied for register of pesticide and also not been approved to apply as pesticide. It can only be used as raw material of sodium pentachlorophenol and PCP. Although DDT retains register of pesticide, it has been forbidden to apply as pesticide. At present, it is only allowed to be used as intermediate of dicofol production, vector prevention and export.

As 9 POPs pesticides, e.g. DDT and hexachlorobenzene, etc. are hazardous chemicals, when they are applied and sold as industrial intermediate and raw materials, it must implement safety administration complying with the Regulations on the Safety Administration of Dangerous Chemicals issued by State Council of PRC.

According to the Regulations on the Safety Administration of Dangerous Chemicals, the country has implemented safety production registration system for hazardous chemical manufacturers. No. 35 command, Measures for the Administration of Registration of Hazardous Chemicals issued by former State Economic & Trade Committee regulated that, manufacturers should register following contents at chemical registration center of MEP: basic condition of production and storage unit; productivity, annual output and largest stock of hazardous chemicals; product standards of hazardous chemicals; danger identification and assessment report of new chemicals and chemicals with uncertain dangerous property; safety data sheet and safety label of chemicals; and emergent service phone number.

The regulation has also carried out classification, label and chemical safety data sheet system for hazardous chemicals. It requires hazardous chemical manufacturers to classify their produced hazardous chemicals, stamp or tie safety label to product packages and provide chemical safety data sheet for users in accordance with national related standards.

Project Document for China dicofol project

In January 1999, former State Economic & Trade Committee issued No. 6 Command, Catalogue of Outdated Production Capacity, Technologies and Products to Be Phased Out (Batch 1), regulating that all regions, departments and related enterprises should make plans and take forceful measures to phase out outdated production capacity, technologies and produced listed in the catalogue firmly in limited period and should not renew, transfer, produce and apply the production capacity, technologies and produced listed in the catalogue without any exception. POPs substances, e.g. chlordane and heptachlor, etc. were immediately listed in outdated products in 2000. Above regulations are also applicable for POPs pesticide manufacturers.

According to regulations of Law of the People's Republic of China on Prevention of Environmental Pollution Caused by Solid Waste, the country has implemented catalogue of hazardous wastes, declaration and registration, manifest of hazardous waste transfer and import & export license system for hazardous wastes, including POPs waste.

In January, 1998, State Environmental Protection Administration of China, former State Economic & Trade Committee and Ministry of Public Security issued National Catalogue of Hazardous Wastes jointly, which classified hazardous wastes to 47 catalogues, of which, Catalogue 4 pesticide wastes(containing organochlorine wastes) included all hazardous wastes generated in POPs pesticides production.

According to regulations of Law of the People's Republic of China on Prevention of Environmental Pollution Caused by Solid Waste, the country has carried out declaration and registration system for industrial solid wastes. Enterprises producing hazardous wastes must declare and register in accordance with related national provisions. Declared and registered contents include generation of hazardous wastes, waste sources and storage, discharge, application and disposal, etc. When it is required to transfer hazardous wastes, it must fill up manifest of hazardous waste transfer in accordance with related regulations of China and report to administrative authorities of environmental protection of People's Government above the level of County where the hazardous waste is transferred from and to.

Comprehensive legislation exists for the management of DDT production, storage, transportation, distribution, use, and disposal, but enforcement is insufficient.

Regulations on the safety administration of hazardous chemicals (the Regulations) and the detailed implementation guideline clearly make DDT an administrative target. The hazardous chemicals in the List of Dangerous Goods (GB 12268), issued as national standards, are the administrative objects of above regulations, in which DDT is listed.

The Regulations clearly indicate responsibilities of parties which produce, store, transport, distribute, use, and dispose DDT. According to requirements of the Regulations, the whole process of the production, storage, transportation, distribution, use and disposal of DDT is to be well managed. However, the management responsibilities are allocated to departments of safety, transportation, quality inspection, environmental protection, and health, respectively. The lack of united coordination mechanism results in inconsistency of planning and implementation of the Regulations, and greatly limits their intended functions.

Project Document for China dicofol project

Feb 27, 1992, Guidance of structural adjustment for chemical products, former Chemical industry ministry - Principally, new plants for dicofol production will be not supported.

1995, Method for the determination of dicofol residues in tea for export—Gas chromatography, SN/T 0348.1-95 -Determination of dicofol residues in tea.

March 27, 1996, A regulation to enforce the management of pesticide industry, Chemical industry ministry - Prohibition of the ratification and Registration of low drug effect and high toxic and pesticides, which include dicofol.

June 26, 1996, Re-emphasize the 7 regulations for pesticide management, Chemical industry ministry - DDT produced by Yangzhou Pesticide Factory can be only used as the intimidate for dicofol production in this factory.

June 20, 1997, Prohibit the dicofol usage on the tea plant, Agriculture ministry - Prohibit the usage of dicofol on the tea plant. Dicofol products must be labeled as not for tea plant.

Aug 13, 1999, Prohibition of duplication of similar projects in the industry and commerce, former State Economy and Trade Committee - Duplication of dicofol production projects was prohibited.

June 5, 2002, No. 199 circular from Agriculture ministry, Agriculture ministry - Prohibit the usage of dicofol and fenvalerate on the tea plant.

2002, “Dicofol technical” HG 3699-2002, Requirements for dicofol technical product, analysis, label, package, storage and transportation. Top grade products (Dicofol \geq 95% DDT γ [1] \leq 0.1%) salable product (Dicofol \geq 90% DDT γ \leq 0.5%).

2002, “Dicofol emulsifiable concentrates”, HG 3700-2002 Requirements for dicofol emulsifiable concentrates, analysis, label, package, storage and transportation. Top grade products (Dicofol \geq 40% DDT γ \leq 0.2%) salable product (Dicofol \geq 20% DDT γ \leq 0.5%).

June, 2003, Chinese national standard requires that DDT residue in Dicofol should not exceed 0.5% and 0.1% in technical products and in 20% Dicofol formulation, respectively.

2005, Guidance for the industrial structure adjustment (limited categories), State council - Limitation of Open production of dicofol by DDT.

2006, Guidance for the industrial structure adjustment (categories of phase out), State council - Phase out of Open production of dicofol by DDT.

Chinese Government promulgated a series of special law, regulation about pesticides and danger chemicals. Annex 4 lists the laws, regulations and standards specific to POPS, DDT and Dicofol.

Though there are a lot of regulations, policies and guidance for dicofol and DDT, but the gaps are lack of harmony in different ministries and powerful supervision.

Regulations of National Laws and Standards on Dicofol Manufacturers

Project Document for China dicofol project

Chinese governmental has reinforced establishment of environmental laws since 1970's. In addition to listing Articles on environmental protection and natural resources in national constitution, in recent years, the government has issued a series of environmental protection laws, e.g. Environmental Protection Law of the People's Republic of China, Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution, Law of the People's Republic of China on Prevention and Control of Water Pollution and Law of the People's Republic of China on Prevention of Environmental Pollution Caused by Solid Waste, etc.

Main environmental protection laws, regulations and rules related with POPs administration are as shown in Table 1.

*Table 1 Main Environmental Protection Laws and Regulations on POPs Administration in China

Law/regulation name	Issuing institution	Implementation date	Applicable scope
<i>Environmental Protection Law of the People's Republic of China</i>	NPC Standing Committee of PRC	Revised in 1989	Basic environmental protection law
<i>Law of the People's Republic of China on Prevention and Control of Water Pollution</i>	NPC Standing Committee of PRC	Revised in 1995	Pollution prevention of surface water, e.g. river, lake, canal, channel and reservoir, etc. as well as groundwater
<i>Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution</i>	NPC Standing Committee of PRC	Revised in 2000	Prevent atmospheric pollution, protect and improve living environmental and ecological environment
<i>Law of the People's Republic of China on Prevention of Environmental Pollution Caused by Solid Waste</i>	NPC Standing Committee of PRC	1996	Prevention of environmental pollution caused by solid waste and hazardous waste
<i>Marine Environment Protection Law of the People's Republic of China</i>	NPC Standing Committee of PRC	Revised in 1999	Protect marine environment as well as resources and prevent pollution and damage
<i>Regulations on the Administration of Construction Project Environmental Protection</i>	State Council of PRC	November 1998	Environmental administration of chemical industry and other construction projects
<i>Provisions on Environmental Administration of the First Import of Chemicals and the Import and Export of Toxic Chemicals</i>	State Environmental Protection Administration of China, etc.	May 1994	Import & export of toxic chemicals forbidden or strictly restricted by China
<i>Interim Provisions for the Administration of Environmental Protection regarding the Import of Waste Materials</i>	State Environmental Protection Administration of China, etc.	1996	Environmental supervision and administration regarding the import of waste materials

In order to protect human health and ecological environment and administrate safety of hazardous chemicals, in line with the guidelines of "Safety First, Prevention First", China's government has also formulated a series of special laws, regulations and department rules aiming to pesticides and hazardous

Project Document for China dicofol project

chemicals specially. Special laws and regulations related with hazardous chemicals, pesticides and POPs administration in China are as shown in Table 2.

*Table 2 Special Administrative Laws and Regulations on Hazardous Chemicals and Pesticides in China

Law/regulation name	Issuing institution	Implementation date	Applicable scope
<i>Safety Production Law of the People's Republic of China</i>	NPC Standing Committee of PRC	November 2002	Supervision and management of safety production and emergent handling of accidents
<i>Regulations on the Safety Administration of Dangerous Chemicals</i>	State Council of PRC	March 2002	Production, operation, application and Import & export of hazardous chemicals as well as monitoring and management of significant hazardous sources
<i>Administrative Regulations of the People's Republic of China on Pesticides</i>	State Council of PRC	Revised in November 2001	Administration on pesticide registration, production license, safety application and import
<i>Food Hygiene Law of the People's Republic of China</i>	NPC Standing Committee of PRC	October 1995	Food hygiene as well as production and operation
<i>Law on the Prevention and Cure of Occupational Diseases of the People's Republic of China</i>	NPC Standing Committee of PRC	May 2002	Prevention and cure of occupational diseases as well as supervision and administration of occupational health
<i>Regulations on Labor Protection in Workplaces Where Toxic Substances Are Used</i>	State Council of PRC	April 2002	Labor protection in workplaces where toxic substances are used
<i>Measures for the Administration of Operating Licenses for Hazardous Chemicals</i>	Former State Economic & Trade Committee	November 2002	Administration of operating licenses for hazardous chemicals
<i>Measures for the Administration of Production License for Industrial Products</i>	General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China	June 1 st , 2002	Improve product quality, ensure product safety and standardize administration of production license for industrial products
<i>Regulation For Chemical Usage Safety in Work Place</i>	Former Ministry of Labor/Ministry of Chemical Industry	December 1996	Responsibilities of chemicals production, application and transport units as well as preparation of MSDS
<i>Measures for the Administration of Registration of Hazardous Chemicals</i>	Former State Economic & Trade Committee	November 2002	Administration of registration of hazardous chemicals
<i>Catalogue of Outdated Production Capacity, Technologies and Products to Be Phased Out (Batch 1)</i>	Former State Economic & Trade Committee	February 1999	Eliminate outdated products, e.g. polychlorinated biphenyl, chlordane and heptachlor, etc.
<i>Administrative regulations on Termite Control of Urban Housing</i>	Ministry of Construction of PRC	November 1999	Administration on termite control, examination and elimination of urban housing

Project Document for China dicofol project

China has set up a series of national and local standards on environmental quality, pollutant discharge as well as safety of hazardous chemicals to control discharge of hazardous chemicals including POPs as well as other environmental pollutants. POPs control limits in various effective standards of China are as shown in Table 3.

*Table 3 POPs Control Limits in Various Effective Standards of China

Standard name and No.	POPs Control Limits
<i>Integrated Wastewater Discharge Standard</i> (GB8978-96)	Maximal permissible discharge concentration of 69 pollutants, of which, for chlorobenzene: 0.2mg/l(water Category I); 0.4mg/l(water Category II); 1.0mg/l(water Category III); sodium pentachlorophenol: 5.0mg/l(water Category I); 8.0mg/l(water Category II); 10mg/l(water Category III). No discharge concentration for other POPs substances.
<i>Integrated Emission Standard of Air Pollutants</i> (GB16297-1996)	Discharge thresholds for 33 air pollutants, of which, for chlorobenzene: 0.5mg/m ³ (existing pollution sources); 0.4mg/m ³ (new pollution source), but no discharge thresholds for other POPs substances.
<i>Water Quality Standard for Fisheries</i> (GB11607-89)	In water of fisheries, DDT≤0.001mg/l, no control standards for other POPs
<i>Sea Water Quality Standard</i> (GB3067-1997)	DDT≤0.00005mg/l(sea Category I); DDT≤0.0001mg/l(sea Category II ~ IV); no control standards for other POPs
<i>Environmental Quality Standard for Surface Water</i> (GHZB1-1999)	Standards for concentration of organics in three categories of water quality, of which BHC: 0.05mg/l; PCB: 8.0×10 ⁻⁶ mg/l; DDT: 0.001mg/l; PCP: 0.00028mg/l. No concentration standards for other POPs
<i>Environmental Quality Standard for Soils</i> (GB15618-95)	DDT: ≤0.05mg/kg(soil Category I); ≤0.50mg/kg(soil Category II); ≤1.0mg/kg(soil Category III); No standards for other POPs pollutants
<i>Quality Standard for Ground Water</i> (GB/T14848-1993)	DDT: not inspection(groundwater Category I); ≤0.005μg/l(Category II); ≤1.0μg/l(Category III, IV); >1.0μg/l(Category V), No control standards for other POPs substances
<i>Sanitary Standard for Drinking Water</i> (GB5749-85)	DDT: 1μg/l; No water quality standards for other POPs pollutants
<i>Pollution Control Standard of BHC and DDT in Food</i> (GB2763-81)	DDT: ≤0.2mg/kg(food provisions and tea); ≤0.1mg/kg(vegetable and fruits); ≤1mg/kg(fish and eggs); No standards for other POPs substances
<i>Hygienic Standard for Cosmetics</i> (GB7916-87)	Forbid to use 359 matters in cosmetics, including hexachlorobenzene, endrin and DDT, etc.
<i>Occupational Exposure Limit for Hazardous Agents in the Workplace</i> (GBZ2-2002)	DDT: 0.6mg/m ³ for short term exposure limit (time weighted mean value), no contact limits for other POPs
<i>Hygienic Standards for the Design of Industrial Enterprises</i> (TJ36-79)	Permissible concentration of hazardous substances in air of workplace: DDT 0.3mg/m ³ . No permissible concentration for other POPs substances.

Since 1986, the country has also issued a series of safety standards and technical specifications for classification, storage, transport, package and labels, etc. of hazardous chemicals(see Table 4).

*Table 4 Main National Standards Involved in Safety of Hazardous Chemicals (including POPs)

Standard name and No.	Issuing institution	Applicable scope
<i>Classification and Labels of Dangerous Chemical Substances Commonly Used</i> (GB 57-92)	China State Bureau of Quality and Technical Supervision	Classification of danger and packaging label of dangerous substances
<i>General Rules for Preparation of Precautionary Label for Dangerous Industrial Chemicals</i> (GB/T 15258-94)	China State Bureau of Quality and Technical Supervision	Contents, format, print and application of safety label

Project Document for China dicofol project

<i>List of Dangerous Goods</i> (GB 12268-90)	China State Bureau of Quality and Technical Supervision	Name and No. of dangerous chemical substances
<i>Classification of Health Hazard Levels from Occupational Exposure to Toxic Substances</i> (GB 5044-85)	China State Bureau of Quality and Technical Supervision	Classification of health hazard levels from occupational exposure to toxic chemical substances
<i>The Principle of Classification of Transport Packaging Groups of Dangerous Goods</i> (GB/T 15089-94)	China State Bureau of Quality and Technical Supervision	Class and classification of packages of dangerous goods
<i>Labels for Packages of Dangerous Goods</i> (GB 190-90)	China State Bureau of Quality and Technical Supervision	Label type, name, size and color, etc. of packages of dangerous goods
<i>Rule for Storage of Chemical Dangers</i> (GB15603-1995)	China State Bureau of Quality and Technical Supervision	Storage method, warehousing and warehouse-out management as well as waste disposal
<i>General Specifications for Transport Packages of Dangerous Goods</i> (GB12463-90)	China State Bureau of Quality and Technical Supervision	Technical requirement for packages of dangerous goods in transport
<i>Classification and Labels of Dangerous Chemical Substances Commonly Used</i> (GB13690-92)	China State Bureau of Quality and Technical Supervision	Classification and labels of dangerous chemical substances commonly used
<i>Occupational Exposure Limit for Hazardous Agents in the Workplace</i> (GBZ 2-2002)	Ministry of Health of PRC	Allowable concentration of hazardous agents, e.g. DDT and chlorobenzene, etc. in the air of workplace
<i>Standard for Safety Application of Pesticides</i> (GB4285-89)	State Environmental Protection Administration of China	Safety application of pesticides used for pest control of crops
<i>Guideline for Safety Application of Pesticide</i> (1- 5) (GB8321.1-5,87-97)	China State Bureau of Quality and Technical Supervision	Standard for safety application of pesticide
<i>General Rules for Preparation of Chemical Safety Data Sheet</i> (GB16483-2000)	China State Bureau of Quality and Technical Supervision	Format and content requirement for preparation of chemical safety data sheet
<i>Guideline on Labels for Pesticide Products</i> (NY608-2002)	Ministry of Agriculture of PRC	Contents and requirements of labels on pesticide products

Comprehensive legislation exists for the management of DDT and dicofol production, storage, transportation, distribution, use, and disposal, but enforcement is insufficient.

Regulations on the safety administration of hazardous chemicals (the Regulations) and the detailed implementation guideline clearly make DDT an administrative target. The hazardous chemicals in the List of Dangerous Goods (GB 12268), issued as national standards, are the administrative objects of above regulations, in which DDT is listed.

The Regulations clearly indicate responsibilities of parties which produce, store, transport, distribute, use, and dispose DDT. According to requirements of the Regulations, the whole process of the production, storage, transportation, distribution, use and disposal of DDT is to be well managed. However, the management responsibilities are allocated to departments of safety, transportation, quality inspection, environmental protection, and health, respectively. The lack of united coordination mechanism results in inconsistency of planning and implementation of the Regulations, and greatly limits their intended functions.

Project Document for China dicofol project

Feb 27, 1992, Guidance of structural adjustment for chemical products, former Chemical industry ministry - Principally, new plants for dicofol production will be not supported.

1995, Method for the determination of dicofol residues in tea for export—Gas chromatography, SN/T 0348.1-95 -Determination of dicofol residues in tea.

March 27, 1996, A regulation to enforce the management of pesticide industry, Chemical industry ministry - Prohibition of the ratification and Registration of low drug effect and high toxic and pesticides, which include dicofol.

June 26, 1996, Re-emphasize the 7 regulations for pesticide management, previous Ministry of Chemical Industry - DDT produced by Yangzhou Pesticide Factory can be only used as the intermediate for dicofol production in this factory.

June 20, 1997, Prohibit the dicofol usage on the tea plant, Agriculture ministry - Prohibit the usage of dicofol on the tea plant. Dicofol products must be labeled as not for tea plant.

Aug 13, 1999, Prohibition of duplication of similar projects in the industry and commerce, former State Economy and Trade Committee - Duplication of dicofol production projects was prohibited.

June 5, 2002, No. 199 circular from Agriculture ministry, Agriculture ministry - Prohibit the usage of dicofol and fenvalerate on the tea plant.

2002, “Dicofol technical” HG 3699-2002, Requirements for dicofol technical product, analysis, label, package, storage and transportation. Top grade products (Dicofol \geq 95% DDT γ [1] \leq 0.1%) salable product (Dicofol \geq 90% DDT γ \leq 0.5%).

2002, “Dicofol emulsifiable concentrates”, HG 3700-2002 Requirements for dicofol emulsifiable concentrates, analysis, label, package, storage and transportation. Top grade products (Dicofol \geq 40% DDT γ \leq 0.2%) salable product (Dicofol \geq 20% DDT γ \leq 0.5%).

June, 2003, Chinese national standard requires that DDT residue in Dicofol should not exceed 0.5% and 0.1% in technical products and in 20% Dicofol formulation, respectively.

2005, Guidance for the industrial structure adjustment (limited categories), State council - Limitation of Open production of dicofol by DDT.

2006, Guidance for the industrial structure adjustment (categories of phase out), State council - Phase out of Open production of dicofol by DDT.

Chinese Government promulgated a series of special law, regulation about pesticides and danger chemicals. Annex 4 lists the laws, regulations and standards specific to POPS, DDT and Dicofol.

Though there are a lot of regulations, policies and guidance for dicofol and DDT, but the gaps are lack of harmony in different ministries and powerful supervision.

Project Document for China dicofol project

Annex II

Program for IPM Demonstration

1. Background

China is an agricultural country. About 45% population is engaged in agriculture. Due to large population and limited available land, all crops are managed by farmers themselves. Multi-crop cultivation results in occurrences of multi-pests frequently. Because the farmers are short of IPM knowledge, they depend on chemical control. Abuse and misuse of large amount of pesticides lead to environment pollution, pest resistance, residue, harmful to human and animals, phototoxicity etc.

Dicofol is a kind of organochlorine miticide able to kill a wide range of mites, strongly active, and safe to natural enemies and crops. This pesticide belongs to nerve agent and has strong contact-killing effects to harmful mites without systemic properties. It can be used to kill eggs, young and adult mites. It is of broad spectrum, cheap, excellent efficacy and widely used for controlling mites in agriculture. Dicofol is registered on cotton, citrus and apple currently, which is widely distributed in 23 provinces of total 34 provinces in China..

Dicofol is moderately toxic and suspected as carcinogen (OPP-CAN), endocrine toxicant (EPA-SDWA, IL-EPA, JNHS, KEIT, WWF), gastrointestinal or liver toxicant (RTECS), immunotoxicant (EEC), kidney toxicant (MERCK), neurotoxicant (EVAN, RTECS) and skin or sense organ toxicant (EEC). It is also highly toxic to aquatic life and can cause egg-shell thinning in some bird species.

Chinese Government has prohibited the construction or establishment of new facility for dicofol production. The application of dicofol has been banned in tea planting and the prohibition will be considered for the use in other crops during the course of the Project. Chinese Government encourages development and demonstration of new pesticides, which are environment friendly, with high efficacy and low toxicity. This project will help China to strengthen the capacity for the elimination of dicofol and promotion of alternatives; gain valuable experience to achieve sound management of chemicals. Dicofol has been listed as 'high pollution and high risk to environment chemicals', which will be phased out in future in China.

Dicofol is listed as 'double high, i.e. high pollution and high risk to environment', chemical by MEP recently. Dicofol will be restricted and lead to phase out in near future.

Nowadays, seven countries including South Africa, Australia, India, New Zealand, Portugal, Canada and US, still registered for use of dicofol in agriculture area; while, Slovenia and Germany had been cancelled its registered and severely restricted any use of dicofol. Most of North Europe countries (Sweden, Belize, Finland, Netherlands and Norway) banned it already, and EU will soon propose Dicofol as a POP.

2. Strategy

Considering that part of dicofol is produced, using DDT as intermediate, in non-closed system in China, and the toxicity that dicofol itself has, during the proposed phase of the Project, China will close down two plants that use DDT in dicofol production in non-closed systems and improve and reinforce

Project Document for China dicofol project

closed system in dicofol production. China will seek, in certain areas, dicofol phase out through alternate technologies, including IPM and prepare for comprehensive tackling the risk caused by DDT.

In order to achieve the ultimate global environment benefits, promote simultaneously the improvement of agricultural planting level in China and safeguard food safety, the Project will devote to demonstration of alternative IPM technologies that accord with the situation in China. The Project will refer to the practical experience from UNEP and FAO, etc., and the experience gained in European countries and the US to ensure the success of the Project. During the design and implementation phases, close consultations and cooperation with FAO, STAP and US EPA will also take place to adopt the relevant experience and expertise to ensure the successful implementation of IPM. The project will take into account the essentials required in implementation of IPM and select the technologies that fit into the features in the demonstration sites for demonstration, combining the practical situation in China.

Integrated Pest Management (IPM) is a comprehensive approach to solving pest problems.

Instead of simply trying to eradicate a pest, an IPM approach considers all of the information and experience available, accounts for multiple objectives, and considers all available preventive and curative options.

- a) **Identify the pest(s)** : Correct pest identification is required to identify optimum solutions.
- b) **Understand the biology and economics** of the pest and the system in which the pest exists.
- c) **Monitor** pests and natural controls. Use standardized, tested monitoring methods rather than basing decisions on haphazard observation.
- d) **Establish economic thresholds.** Pest management decisions are based on the potential damage from pest infestations, status of natural enemies, sensitivity of the protected site (such as stage of development of a crop), and the weather. Actions are taken only when the potential damage is sufficient to justify action.
- e) **Select an appropriate strategy** of cultural, mechanical, agricultural, biological, and/or chemical prevention or control techniques.

Cultural practices include habitat modification and adapting operating procedures so that pest damage is reduced and natural control is enhanced. Sanitation is the removal or cleaning of sources of pest infestation. Choosing plant varieties that are resistant to pest injury is a cultural control. Other agricultural examples are adjusting planting time, fertilization, tillage, and harvest operations to have the most beneficial or least detrimental affect on the pest management situation.

Biological controls are predators, parasites, and diseases that attack pests. Measures can be taken to conserve naturally occurring populations. In some situations where naturally occurring biological controls are not effective, they can be introduced from outside sources.

Chemical control involves selecting a pesticide with the lowest toxicity to humans and non-target organisms (including biological controls), and using it in such a way as to prevent or minimize undesirable environmental effects. The lowest effective amount of pesticide is applied from carefully calibrated spray equipment.

In conclusion, the selection of representative demonstration sites and the design of IPM technology that are in accordance with the characteristics of the demonstration sites, based on the above principles,

Project Document for China dicofol project

are the ingredient to insure the implementation of the Project and even to solve the problem of environment risk caused by dicofol production, using DDT as intermediate, in China.

3. Selection of demonstration areas and alternatives

In order to implement the Project, three demonstration counties are selected from top 10 dicofol consumption provinces according to a number of criteria. The main dicofol consumption crops citrus, apple and cotton will be demonstrated in Yidu City, Luochuan County and Zhanhua County, respectively.

3.1 Demonstration areas selected

There are two steps to select demonstration areas. Firstly, to select demonstration province, and then the demonstration counties.

3.1.1 Demonstration Province Selection

Criteria for Selection of province are:

- The representative area of using dicofol
- The representative crop of planting
- The representation of mite occurrence and the scale of harm

Procedure

The representative area of using dicofol

Table 1 the consumption of the 10 top provinces

No.	Province	Total (ton as 20% formulation)
1	Shandong	814
2	Hebei	718
3	Guangxi	574
4	Hubei	424
5	Shanxi	403
6	Shaanxi	400
7	Anhui	308
8	Fujian	248
9	Liaoning	200
10	Guangdong	180

The representative crop of planting

Table 2 the percentage of the output in the 10 top provinces to the output in all country

No.	Province	Citrus	Apple	Cotton
1	Shandong		18.14%	18.61%
2	Hebei		14.20%	11.75%
3	Guangxi	8.25%		0.03%
4	Hubei	7.66%	0.19%	7.17%

Project Document for China dicofol project

5	Shanxi		8.14%	2.01%
6	Shaanxi	1.11%	21.96%	1.41%
7	Anhui	0.14%	0.86%	7.01%
8	Fujian	10.18%	0.01%	
9	Liaoning		5.96%	0.09%
10	Guangdong	10.80%		

* Data from 2005 China Agriculture Year Book

The representation of mite species, occurrence and the scale of harm

Table 3 Apple

No.	Province	<i>Panonychus</i> (Koch)	<i>Tetranychus</i> <i>viennensis</i> Zacher	<i>Bryobia</i> <i>rubrioculus</i> (schenten)	<i>Tetranychu</i> <i>s urticae</i> Koch
1	Shandong	√	√	√	√
2	Hebei	√	√	√	√
3	Guangxi				
4	Hubei	√			
5	Shanxi	√	√	√	
6	Shaanxi	√	√	√	
7	Anhui				
8	Fujian				
9	Liaoning	√	√	√	
10	Guangdong				

Table 4 Citrus

No.	Province	<i>Panonychus citri</i> <i>McGregor</i>	<i>Eotetranychus</i> <i>kankitus</i> Efran	<i>Phullocoptruta</i> <i>oleivora</i> (Ashmead)	<i>Eriophyes</i> <i>sheldoni</i> Ewing
1	Shandong				
2	Hebei				
3	Guangxi	√		√	√
4	Hubei	√	√	√	√
5	Shanxi				
6	Shaanxi				
7	Anhui	√		√	
8	Fujian	√		√	
9	Liaoning				
10	Guangdong	√		√	√

Project Document for China dicofol project

Table 5 Cotton

No.	Province	<i>Chrysopa Formosa Brauer</i>	<i>C. septempunctata Cognata</i>	<i>C. sinica Tjeder</i>	<i>Scolothrips takahashii Priesmer</i>
1	Shandong	√	√		√
2	Hebei	√	√		√
3	Guangxi				
4	Hubei				
5	Shanxi	√	√		
6	Shaanxi	√	√		
7	Anhui				
8	Fujian				
9	Liaoning	√	√		
10	Guangdong				

Result

Although many provinces meet the criteria for demonstration site, the underdevelopment economic situation will be a barrier for them to provide financial support for the project. Poor education will be a barrier for the farmers to accept IPM technologies. Poor technical capability will be a difficulty for them to implement the project. So, three additional criteria were set as:

- The strength of support provided by the local government;
- The history and experience in plant protection;
- Comparatively complete administration institution and related laws, policies and standards.

Based on above information, the three provinces were proposed as demonstration regions, i.e. Hubei as citrus site, Shaanxi as apple site, Shandong as cotton site.

3.1.2 Selection of demonstration county

Proposed by the province

In order to select the demonstration counties, three candidate counties, respectively, were proposed by the three provinces selected and their applications were submitted. Based on above criteria, Nine candidate demonstrate areas, i.e. Yidu City, Zigui County, and Yiling County, Hubei Province, Luochuan, Changwu and Pucheng Counties, Shaanxi Province and Zhanhua, Xiajin, Yuncheng Counties, Shandong Province, were recommended by local government.

Evaluated by the expert team

After reviewing the bidding application documents and visiting sites, seven experts from MOA, NATEC, ICAMA, CAAS and CAU commented according to the application report and the visit to the candidate sites. The counties with highest score were selected as demonstration counties.

Project Document for China dicofol project

Result

Based on the comments, three counties were selected as demonstration sites, i.e. Yidu City in Hubei as citrus site, Luochuan County in Shaanxi as apple site, Zhanhua County in Shandong as cotton site. There is rich experience in the three counties. The local governments are eager in environmental protection and willing to provide necessary financial and administration support.

Basic information on the selected demonstration counties

Yidu City locates in the southwest of Hubei Province with a population of 400,000, where the rural population is 291,000. The city covers a total area of 1,357 km², where the citrus plantation area is 13,000 hectares and annual citrus output is 160,000 t. The use of dicofol was approximately 9520 kg in citrus in recent five years in Yidu County, which is equivalent to 47600 kg 20% dicofol emulsion. The income from citrus account for 90%, approximately, of total cash crop.

Luochuan County locates in the north of Shaanxi Province with a population of 204,000, where the rural population totalizes 161,000. The county covers the area of 1,804.8 km², including cultivated land 42,700 ha, where the plantation area of apple trees is 33,300 ha, accounting for 78.1% of the cultivated land. Around 95% of the cash crop income comes from the apple industry in the county. In recent five years, the use of dicofol was 5500 kg per annum, in average, which is equivalent to 27500 kg of 20% dicofol emulsion.

Located in the north of Shandong Province, Zhanhua County governs a population of 385,000, where the rural population totalizes 339,000 people. The county covers total area of 220,000 ha, including 65,000 ha of cultivated land in which the cotton area is 30,000 ha, accounting for 46% of the cultivated land. The total lint yield was 35,000 t. The main variety of cotton was Bt insect-resistant transgenic cotton in 2005. The use of dicofol was approximately 9500 kg in cotton in recent five years in Zhanhua County, which is equivalent to 47500 kg 20% dicofol emulsion.

3.2 Selection of alternatives and IPM technologies

3.2.1 Collecting the currently technologies in the world

Techniques used in worldwide in these three crops were collected and evaluated. The main results from the surveyed countries are presented in Table 6.

Table 6 main harmful mite control technology in the world

No.	Alternatives Technology	Contents	US	Italy	Australia	New Zealand	China
1	Predatory Mite	<i>Amblyseius cucumeris</i>	√	√	√	√	√
2	Spray Oil	Vegetable oil, petroleum oil	√	√	√	√	√
3	Acaricide		√	√	√	√	√
4	Agricultural Control	Pruning and sanitary		√			√
5	Planting Weeds	Clover, Ageratum			√	√	√

Project Document for China dicofol project

		<i>(Ageratum houstonianum)</i>					
6	Prediction & Monitoring		√	√	√	√	
7	Pheromone		√	√	√	√	√
8	Light luring						√
	Luring ring						√
9	Yellow Board		√	√	√	√	√

3.2.2 Selected technologies for the project

According to the Convention, China should take measures to control DDT emission during the course of dicofol production, residual DDT and DDT in the waste to reduce the release of DDT to the environment. As dicofol is an important acaricide used currently in agriculture, the impact that the phasing out of dicofol will bring to the farmers must be considered. Alternatives to dicofol are therefore one of the key measures for the phasing out of DDT in China. The socio-economic and environmental evaluation recommends that the selected new alternatives should have better or at least the same efficacy on mites as dicofol. The alternatives should be non-toxic or low toxic and environmentally sound and the price should be acceptable to farmers.

Based on the international commercial application technologies, as well as feasibility to apply the technologies, following key technologies in IPM system are proposed to use in the demonstration sites.

Apple

Field sanitary, predatory mites, plant weeds, monitoring and predicting, selected acaricides. Other IPM technologies include light luring, luring ring, pheromone, and yellow board for control of other insects to reduce the application of chemicals..

Citrus

Field sanitary, predatory mites, plant weeds, monitoring and predicting, selected acaricides. Other IPM technologies include light luring and yellow board for control of other insects to reduce the application of chemicals.

Cotton

Field sanitary, autumn irrigation, monitoring and predicting, selected acaricides and protecting natural enemies.

3.2.3 Selected chemicals

Although non-chemical technologies can reduce pesticide application in IPM system, pesticide is an important component in IPM system. When mites break out beyond the economic threshold, non-chemical alternatives can not replace acaricides. The selected acaricides for emergence use are listed as follows.

Table 7 Proposed chemicals for mite control produced in China

Chemical	Number of manufacturer	Capacity of production (t)
Propargite	8	3600
Pyridaben	5	2670

Project Document for China dicofol project

Fenprothrin	5	2125
Abermectins	20	1125
Clofentezine	4	100
Amitraz	6	1500
Hexythiazox	3	520
Monoamitraz (Semiamitraz Chloride)	1	375
Diafenthiuron	3	550
Fenisobromolate	1	50
Spraying oil	5	1000

3.3 Barriers for implementation IPM technologies

As a developing country, China still faces major barriers for the phase-out of dicofol and the shift to alternatives. Such barriers include:

1) The prices of currently available alternatives are generally higher than dicofol that will increase the cost of production of crops.

2) Farmers rely on dicofol which has been proven effective at acceptable cost, they are unwilling to shift to new techniques because of higher costs and the risk of failure associated with adopting new techniques;

3) Few farmers have knowledge on IPM. Farmers do not know the disciplinarian of pest, pest resistance, monitoring pest, protecting natural enemies. The control pests mainly depend on spraying pesticides periodically.

4) Insufficient capacity to conduct IPM training and promotion;

5) Weak supervision and management of existing unqualified production, sales and distribution of dicofol, and on waste disposal.

Although there are plant protection station in every country in China, one of the tasks in plant protection station is to monitor pests. A few pests, such as epidemic diseases and immigrate insects, have been listed for monitoring periodically. Mites and many other insects and diseases, however, have not yet listed as the objects of monitoring due to short of fund and communication measures. In addition, many farmers can not access to the information in time. The farmers depend on experience to spray pesticides resulting in overuse, pesticide resistance and residue.

4. IPM Technology for Control of Harmful Cotton Mites

4.1 Occurrence of Harmful Mites

The local species of harmful mites mainly include: *Tetranychus cinnabarinus* (Bvoisduval) and *Tetranychus truncates* (Ehara).

The occurrence of cotton mites has a close relationship with the climate conditions. With the temperature increasing, the growth and development of the mites becomes faster when the temperature is between 20-28 °C. Rainfall is one of the most important factors which affect the population dynamics of cotton mites. The drought and little rainfall favour the occurrence, while downfall reverses the situation.

Project Document for China dicofol project

Cotton mites annually reproduce 12-15 generations in Zhanhua, Shandong. The optimal temperature for the development of *Tetranychus cinnabarinus* (Bvoisduval) is 25-31°C, and the optimal relative humidity 35-55%. Generally, there are two peaks of occurrence each year. The first occurs during middle May and middle June and the second occurs from middle and late July to middle August. In those periods, Shandong Province is experiencing high temperature and drought, which stimulates the reproduction and hazards of cotton leaf mites.

The occurrence of cotton mites is also closely related to the environment in cotton fields. The poor the cotton plants grow, the more serious the occurrence is. The occurrence of leaf mites occur earlier and more serious in fields with complicated culture system, such as intercropping cotton with beans or planting eggplant, sesame, beans and melon adjacent to cotton fields. The field located at higher position of the land or dry is beneficial to the occurrence of cotton leaf mites. The main natural enemies of cotton leaf mites are lacewing, ladybird beetle, predatory mite, which have inhibitory effect on the occurrence of leaf mites.

Other Main Pests include *Heliothis armigera* Hubner, *Aphis gossypii* Glover, and *Lygus lucorum* Mey-Dur.

4.2 Agricultural Measures

Sanitation treatment to the hibernation sites: Deep plough the soil and practice winter irrigation; Clear the weeds surrounding the ridges of the fields or at ditches and use it as decomposed manure in late autumn or early spring to kill the over-wintering mites.

Enhance appropriate water and fertilization management: Apply fertilizers with proper ratio of N, P and K to guarantee desirable growth of cotton plants, thus to strengthen their ability to resist diseases and pests. Minimize application of chemical pesticides.

Plant corn or bean as luring strip in the cotton field, and then apply pesticides to kill the pests in the strip.

Thin out and fix seedlings timely with consideration to agricultural practices. Remove the bottom leaves of cotton plants since cotton red mites spread generally from the bottom to the top of plants, when red mites occur sparsely or in cluster. If severe, pull out the entire mite-injured seedlings for treatment, so as to prevent red mites from spreading.

4.3 Reinforcement of monitoring and forecast

Ten monitoring stations is planned to be established and to monitor periodically in the county to ensure the successful implementation of the Project and the overall grasp of the occurrence and the dynamics of cotton diseases, insects and natural enemies. The survey results will be reported to the local plant protection station and the station will summarize the data collected and analyze the information. Report on the occurrence of cotton diseases and insects will be drafted and printed as bulletins. The information will be also reported to the upper level of plant protection departments and distributed in form of bulletin to related institutions, personnel and farmers.

Project Document for China dicofol project

4.4 Implementation of environment-friendly chemical control

Apply selected acaricides for the control of mite pests while occurrence of mites reaches the economic threshold. The local economic control thresholds are as follows:

Rate of mite infection at seedling stage: 7% (year of drought) - 17% (normal year);

Rate of mite infection at square stage: 5%-14%; and

Rate of mite infection at boll-forming stage: 3%-7%.

Apply lime sulfur of 0.2-0.3 Baume degrees at square to boll-forming stages. Spray it again after a week because the pesticide does not kill eggs. In addition, 50% polysulfide suspension diluted for 300 times may be sprayed. It gets better efficacy when sprayed in the afternoon.

Select the recommended alternative acaricide, e.g. Abamectin, Pyridaben, Hexythiazox, Propargite, Amitraz, Clofentezine, etc., for the control peak occurrence of cotton mites based on the result of monitoring and forecasting. Evaluate the efficacy.

Select low-toxicity chemicals against natural enemies while applying. It protects the natural enemies such as: *Chrysopa Formosa* Brauer, *Stethorus punctillum* Weise, *Scolothrips takahashii* Priestner, and predatory mite.

5. IPM Technologies for Apple Harmful Mites

5.1 Occurrence of harmful mites

The main species of harmful mites include:

Tetranychus viennensis Zacher

Panonychus ulmi (Koch)

Tetranychus viennensis Zacher is the most widely spreads and causes most severe harm. The distribution and the harm of *T. urticae* showed obvious trend of increase.

T. viennensis occurs from first 10 days of April to the end of August with the peak period of mid-June to the last 10 days of July. The occurrence is more severe in droughty years. The period and the quantity of occurrence are related to rainfalls from May to July. Heavy or continuous rainfall is adverse to mite occurrence, while high temperature and drought promote the mite occurrence.

The mite reproduces 6-10 generations annually in Luochuan. The fertilized female adults hibernate inside the bark slits of trunk, main branch or side branch, or soil slit near the branch crossing or trunk. From flower-bud emergence to squaring stage, the over-wintering female adults go up to the trees to harm in large number. In mid- and late April, they lay eggs on young leaves. The distribution of this mite species is as follows: The over-wintering generation mainly clusters inside the crown; the 1st and the 2nd generations gradually move outwards in May to June; the 3rd and 4th generations moves to periphery of the crown in July. *T. veinnensis* spreads by creeping mainly but also dispersed via wind, flowing water, insects, agricultural machinery or branch-grafting of seedlings.

T. veinnensis is not very active. They usually cluster on the back of leaves, having the habit of weaving net, and enjoy high-temperature and droughty climate. The reproduction of one generation needs 12.8d at 25°C. Each female adult lays about 80 eggs in average. As a result, this species is more likely to occur in high-temperature and droughty years.

Project Document for China dicofol project

The first key control period is when the over-wintering female adults wake up from dormancy in early and mid-March before apple trees germinate. The first generation of nymphs occur in large number 7-10 days after blossoms fall in the first 10 days in May, which is the second key control period and the most important one when the spraying must be applied in a year. The period prior to high temperature season, the last 10 days of May to the first 10 days of June, is another key period for mite control. Because *T. veinnensis* is not active. They cluster in the inner part of the crown and on the back of leaves at early infestation period, where are the main target sites for mite control.

Main Species of Natural Enemies include:

Stethorus punctillum Weise

S. chengi Sasaji

S. shunxiensis Pang et Mao

Orius minutus (Linnaeus)

C. phyllochroma Wesmael

Scolothrips takahashii Priesner

5.2 Agricultural Measures

Cleaning the orchard thoroughly: Remove completely the deadwood, defoliated leaves, weeds, mummies, paper bags, etc., and old tilted bark and rough cortex on the trunks during hibernation period, from late autumn (November to December before the pest dormancy) to early spring (in mid-March before tree germination) to eliminate the over-wintering female adults hidden inside, especially in the base of the trunk and slot. Cut off diseased and pest infested dead branches to eliminate the over-wintering mite source and minimize the base number of the pest population. Collect all sundries, dead cortex and cut branches out of orchard and then destroy or deeply bury. Retail the space between apple trees to eliminate the growth of weeds.

Strengthen the growth of trees: Carry out three measures. First, apply sufficient base fertilizer, organic fertilizer mainly, in the orchard before winter, supply with quick result fertilizer in spring and summer, including effective N, P and K and on leaves at the growing stage. Secondly, prune the tree at dormancy stage and protect the cuts immediately. Thirdly, timing irrigation in spring. Fourthly, bridge-grafting. According to the standard of bridge-grafting, choose fit branches from the own trunk to engrafting for fusarium wilt scar in April or May to insure the good growth and improve their insect resistance. This will reduce the plant diseases and insect pests, minimize chemical pesticides and protect predatory mite.

5.3 Physical measures

Apply physical measures, including light luring, yellow board trap and luring tape and bagging the fruit, to control the pests.

Light luring: Hang the frequency-vibrancy pest-killing lamps or solar insecticidal lamp in the last 10 days of April when is flowering stage in the orchard according to the required height and lamp distance which is one lamp per 2 ha. Trap and kill the main phototaxis pests so as to reduce the amount of eggs and the harm.

Project Document for China dicofol project

Yellow-board: Hang 300 yellow boards per hectare from the last 10 days in April to the first 10 days in May, when is period for flower to decline and fruit to set, according to the standard distance and height so as to reduce the density of aphid and the harm.

Luring tape: Bind one luring tape for each tree in the orchard every autumn, around August to September, to trap the harmful mites and over-wintering pests. Unbind them in early spring and take out of orchard to destroy so as to reduce the hibernating index.

5.4 Biological Control

Protect and release natural enemies. Firstly, protect and utilize the local preponderant natural enemies to control pest acarids and other pests. Secondly, release artificially raised predatory mites, *Amblyseius cucumeris*, 1 bag/tree in mid-June. Introduce Trichogrammatid and Thripidae and demonstrate to control the pest mites and other insects.

Spraying Fenazaquin, Hexythiazox or Pyridaben in the first 10 days in April and the first 10 days in May to reduce acarid density.

5.5 Ecological Control

Plant clover in the demonstration areas. Intercrop clover and other suitable flowerer in apple garden in the first 10 days in May, when is the period for flower to decline and fruit to set, so that to establish a good grass mulching system to improve the soil humidity and the soil ability to adjust fertility and water. Improve the biodiversity in orchard and provide natural enemy habitat and essential food. This measures can promise a good effect of ecological control.

5.6 Establishment of Forecasting system

Carry out static and spot-checking measures of monitoring and forecasting. Establish 10 monitoring sites in demonstration areas. According to the recommended standard, monitor regularly from January to December. Make control strategies based on the result of monitoring. Disseminate the information of plant diseases and insect occurrence timely to growers. Guide them to control the insects and diseases in suitable time.

5.7 Environment-friendly Chemical Control

Utilize Pheromone: According to the standard, hang bags containing pheromone of Asiatic apple leaf-miner in first 20 days in March (before germinating), that of small apple tortrix, big apple tortrix in first 10 day in April (alabastrum stage), and that of peach fruit borer in first 10 days in May (fruit-setting stage), 75 pots/ha. Change bait every month to get the good efficacy.

Spraying on the tree: According to the standard, spray pesticides, recommended by the Project, based on the monitoring results of plant diseases and insects from the first 10 days in March to the first 10 days to December.

6. IPM Technologies for Mite in Citrus

6.1 Occurrence of pest mites

Mites are major pests in citrus trees. The main species of harmful mites include:

Panonychus citri McGregor (red spider),

Phyllocoptruta oleivora (Ashmead)

Eotetranychus Sexmaculatus (Riley)

Panonychus citri McGregor): Reproduce 16-18 generations annually, with generation overlapping. This species enjoys light and usually bursts out in the seasons with long daylight, i.e. the transitional period between spring and summer, and the end of autumn and the beginning of winter. The optimal temperature is 19-23°C and humidity 73%-87% in peak season. The mites survive winter as eggs or adults and generally burst out before and after the flowering stage, i.e. in April to May when spring shoots grow and the average temperature is 20°C. As the temperature exceeds 25°C in July-August, the population decreases due to high temperature, high moisture, strong wind and rainfall. The second peak season of occurrence is in September to November with the peak in October to early November. If the over-wintering base number of the population for the previous year is 1 mite/leaf, it is likely to occur severely in the current year.

Phyllocoptruta oleivora (Ashmead): Reproduce 18 generations annually. The adults hibernate at lateral bud and other locations. They start to wake up from hibernation as the temperature reaches 15°C or so in March and April, spread to fruits in May and June, and reproduce rapidly in last 10 days in June. The peak season occurs in July to October. The mites move to the autumn twigs after September. The optimal temperature for its development is 26-32°C. If rain falls after a long droughty and high-temperature period, the population outburst is likely to result in severe harm. Long daylight is suitable for the development of this species. Therefore, the citrus orchards with sparse branches and leaves provide desirable environment for such mites.

Eotetranychus Sexmaculatus (Riley): The eggs or adults hibernate inside the crown or the back of leaves. In mid-March, the over-wintering eggs hatch and the nymphs move to new branches causing harm, which is the key period of pesticide control. The peak season of occurrence is April to May.

6.2 Agricultural Measure

Agricultural measures include:

Pruning, prune away pest infested branches in time to reduce the size of the mite populations.

Strengthen management to fertilizers and water to improve the growth of the trees. Fertilization and water management should be enhanced and well balanced at the branching stage in citrus orchards where harmful mites are active. Application of fertilizer on leaves may motivate the leaves to turn green, strengthen the trees and improve their disease/insect resistance.

Project Document for China dicofol project

Extend sod cultivation technology. Plant benign grass like bahiagrass, *ageratumconyzoides*, etc., to create appropriate ecological environment in the citrus orchard and at the same time to provide a over-summering shelter for predatory mites.

6.3 Physical Measures

Hang up 225-300 pieces of yellow boards per hectare based on the occurrence of insects and diseases in the orchard to stick and kill aphids, spiny black whitefly, *Dialeurodes citri* etc. The height is just above the tree crown. Start to hang up in early April and change a new board when they lost viscous. Utilize the phototaxis of insects and use frequency tremble grid lamps to trap the pest insects at the same time. 300-450 lamps per hectare. Turn on the lamps in Early April and turn off in late October.

6.4 Biological Control

6.4.1 Release predatory natural enemies

Amblyseius cucumeris is an extensively used predatory mite in China. It has great predation and preys and moves actively. it can kill 6-10 *Panonychus citri* McGregor or 80 *Phyllocoptruta oleivora* a day in citrus orchard in South China. It can kill 300-500 *P. citri* or 2000-3000 *Ph. oleivora* in its life.

In order to protect the released predatory mites, chemicals, the pre-treatment, will be applied to reduce thoroughly the pest base number in the population in March to early May so that to ensure that the number of mite eggs is fewer than two per leaf 20 days before releasing *A. cucumeris*. Check for any missing in spraying 15 days before releasing. If mites, including eggs, exceed 2 or scale bugs and aphids or scab is not under control, the second pre-treatment is necessary. Release the predatory mites in sunny evening to avoid the possible rainfall. 1 bag/tree will be released. Preserve grass (*Ageratum conyzoides* or *Chloris gayana*) in the orchard to reduce the ground surface temperature by 2-3°C and improve the humidity by 5-10% to help the survival and the reproduction of natural enemy. If there are *Phyllocnistis citrella* Staiton, use 0.3% Azadirachtin diluted for 750-1500 times to control. Do not use any pesticide or miticide.

6.4.2 Protect natural enemies

Grow plants such as *Chloris gayana* and bahiagrass between rows of citrus tree or surrounding the orchard to create favourable ecological environment for the survival and reproduction of natural enemies. The main natural enemies include:

Erigonidium graminicola

Stothorus pumtium

Scymnus hoffmammi

Serangium japonicum

Chrysepa sinica

Chrysopa shansiensis

Cladosporium cladosporioides

Project Document for China dicofol project

6.5 Establishment of Monitoring and Forecasting System

Choose representative site to monitor the occurrence of the pests in citrus orchard by using phoromen luring and light trapping. Monitor and forecast the time and the quantity of the occurrence of the pest mites. Selective use of environment-friendly pesticides.

6.6 Biological Pesticide

Properly use biological or mineral pesticides such as neem and spray oil in combination with the release of predatory mite under emergent situation to protect natural enemies. If individual tree or small area remain other pests after releasing predatory mites, the individuals will be treated tree by tree. If the new branches have pests, pesticide will be sprayed on the surface of the crown to reduce killing to natural enemies that acts in the inner branches and the vegetation of the ground surface.

6.7 Selected environment-friendly acaricide

According to the results of pests forecasting and control threshold, choose chemicals from the following recommended pesticides when necessary for treating the pest mites.

Mineral Pesticide: Lüying, lüku, Petroleum Spray Oils

Biological pesticides: Azadirachtin, 5% natural pyrethrum

Chemical Pesticides: Pyridaben Bamanling propargite Hexythiazox Clofentezine spirodiclofen

When it is necessary, use each pesticide once a year and rotate pesticides with different mechanism to avoid resistance.

7. Activities for the demonstration of IPM Program

7.1 Develop and update of the implementation plan of IPM program

The plans of implementation include those for schedule, financing, purchasing, coordination mechanism, public participation, supervising scheme for implementation, scheme of evaluation, etc.

The plans will be drafted by experts involved based on on-site survey and data collected and will coordinate with CIO, involving administration departments and local governments.

The implementation plan will be evaluated and updated annually or as appropriately based on the problems that might occur during the implementation.

7.2 Compiling IPM Operating Manual and training material for three demonstration crops

In order to implementation IPM technologies, detailed operation manuals for apple, citrus and cotton will be written by experts, respectively.

The content of operating materials includes pest identification, mite behavior, mite occurrence with climate and crop growth, economic thresholds, monitoring technologies, mite resistance, acaricide selection, IPM technologies. The theoretical knowledge will be expressed in simple and easy language which can be understood by farmers. The content of operating manual will tell farmers when and how to use IPM technologies step by step.

Project Document for China dicofol project

90,000 copies operating manual will be prepared, 30,000 for apple, 30,000 for citrus and 30,000 for cotton. The operating manual will be distributed to each participant.

7.3 Training

The model of 2-level training will be established. The experts will train the trainers who are the technicians who work in plant protection stations in the demonstration counties and townships, and farmers who cultivate relatively larger farms and some farmers who are willing to accept new techniques. The trainers then will train farmers to use IPM technologies, together with the experts

7.3.1 Trainers selection and training of trainers

Working Group, together with the local governments, will select qualified technicians from representative townships. The selected technicians will be future trainers. They include extension workers in plant protection in county and township and technical leaders of farmers.

The planned number of trainers are 80 people each for cotton, apple and citrus. Exams will be held by the end of the training courses and certificates will be awarded to the trainers who pass the training courses.

The planned training for trainers will be held 8 times in each of the three demonstration counties. The trainers from each demonstration villages can get training from the experts directly so that the training of trainers reaches 100%.

Experts will train 240 trainers for the three demonstration counties as the first level training. The training of trainers will be once a year with two groups and there will be 40 people per group. The training course will last three days for the first year. Qualified people will be issued with a diploma of completing the course after an exam. Communication between the trainers and experts will be conducted in scheduled period in the 2nd and the 3rd year. The communication will be scheduled for one day. There will be three courses including six groups in the three years.

7.3.2 Training of farmers

The training will combine in-house and in-field training. Theoretical training include the occurrence characteristics of the pests and diseases, the nature of the chemical pesticides, the resistance of pest insects to chemicals, forecasting of pest insects and diseases and the reasons for using and extending IPM technologies. The techniques used in the fields have the characteristics of open training and the methods are practical. Analysis will be included in the techniques to let farmers know why and how. The solutions to the control of mites will be jointly pursued from the practice of pest damage.

Farmers in-field training: This includes mainly the training from the trainers to farmers. Based on the season, there will be participation, development, inter-action, and face-to-face training for the farmers. There will be eight times that are scheduled in March, April, May, June, July, August, September to October and November to ensure the participation of the farmers who attend the demonstration. The farmers who are interested in the training will be encouraged to participate.

Project Document for China dicofol project

7.4 IPM technologies implementation

IPM technologies will be demonstrated in three selected counties. The components of feasible IPM technology for the project will be arranged as follows:

Table 8 selected IPM technology in demonstration area

No.	Alternatives Technology	Contents	Citrus	Apple	Cotton
Predatory mites scheme					
1	Predatory Mite	<i>Amblyseius cucumeris</i>	300ha	300ha	
2	Planting Weeds	Clover	300ha	300ha	
3	Agricultural Control	Field sanitary	300ha	300ha	
		Land ploughing in autumn and water the land			
4	Alternative chemicals (emergence used)	Selected chemicals	300ha	300ha	
5	Monitoring & forecasting		300ha	300ha	
6	Light luring		300ha	300ha	
7	Yellow Board		300ha	300ha	
Non- Predatory mites scheme					
3	Agricultural Control	Field sanitary	9700ha	9700ha	10000ha
		Land ploughing in autumn and water the land			10000ha
4	Alternative chemicals	Selected chemicals	9700ha	9700ha	10000ha
5	Monitoring & forecasting		9700ha	9700ha	10000ha

Project Document for China dicofol project

Table 9 General calendar for apple pest mite occurrence in Luochuan City and IPM control

Time (Month/Late)	Control	Growth duration	Target pest	Measure	Chemicals	concentration	times
Jan-Feb	General	Dormant period	Crossing winter pest disease	Pruning, Clean Weeds and leaf, scrape off disease spots			
	IPM						
Before 20 th March	General			Scrape off disease spots, clean up apple orchard by spraying,	4 thiophanate-methyl ointment 45% Amobam or 1.5% benziotiazolinone +48% chlorpyrifos or 5°lime sulfur	ointment 400X 400X 800X	1 1
	IPM	Before sprouting	Apple canker, <i>Lithocolletis ringoniella</i> Matsumura and other diseases and insects	Pruning, Clean Weeds and leaf, scrape off disease spots, clean up apple orchard by spraying, hormone attractant to <i>Lithocolletis ringoniella</i> Matsumura (3-5 plate per mu, change every month) Monitoring leaf mites and insects	4 thiophanate-methyl ointment 45% Amobam +3% acetamiprid Or 5°lime sulfur	ointment 400X 1000X	1 1
The first ten day of April	General	Budding period	Apple canker, Apple powdery mildew, leaf mite, Leaf-Roller Moth	Spraying chemicals	1.5% benziotiazolinone or 20% dicofol + fenpropathrin + chlorbenzuron	400X 1000X 2000X	1

Project Document for China dicofol project

	IPM				Spraying chemicals based on monitoring, luring moth light (1 light/30 mu) hormone attractant to <i>Adoxophyes orana</i> Fischer von Roslerstamm (3-5 plate/mu, change every month) and scrape off disease spots Monitoring leaf mites and insects	1.5% benziothiazolinone or 40% flusilazole +15% pyridaben +25% chlorbenzuron	400X 6000X 2500X 2000X	1
The last ten day of April	General	Flowering season	aphid		-	-	-	-
	IPM			Yellow plate Planting weeds			20plate per mu	
Before 20 th May, 7 10d after Deflorate	General	Fruit set period	the early apple wilt disease, Apple canker, leaf mite Aphid, <i>Carpocapsa nipponensis</i> Leaf-Roller Moth	Spraying chemicals	4 thiophanate-methyl ointment 80%mancozeb powder+1.8% Avermectins EC +imidacloprid or flufenoxuron or beta-cypermethrin EC		1 X 800X 6000X 2000X 2000X	1 1
	IPM			Monitoring leaf mites and insects				
The last ten day of May the first ten day of June, Before cover bags	General	Pubera	the early apple wilt disease Aphid(fastigium) leaf mite (before fastigium) <i>Lithocolletis ringoniella</i> Matsumura Leaf-Roller Moth	Spraying chemicals	80 mancozeb powder+70% thiophanate-methyl +48% chlorpyrifos+20% dicofol		800X 800X 800X 1000X 3000X	1
	IPM			Spraying chemicals Based on monitoring Release predatory mite after spraying 10 days Monitoring leaf mites and insects				

Project Document for China dicofol project

The last ten days of June-the first ten day of July, after covering bags	General	Expansion period	the early apple wilt disease Aphid leaf mite <i>Lithocolletis ringoniella</i> Matsumura Leaf-Roller Moth	Smear stem Spraying chemicals	80% mancozeb powder +40% flusilazole+1.8% Avermectins+52.25%Nongdile (chlorpyrifos+beta-cypermethrin) or bordeaux mixture	1
	IPM					
The last ten day of July	General	Expansion period	Apple canker	Smear stem	45% Amobam or 1.5% benziotiazolinone (rotten)	1
	IPM					
The first ten days of August	General	Expansion and coloring period	the early apple wilt disease leaf mite <i>Lithocolletis ringoniella</i> Matsumura Leaf-Roller Moth	Spraying chemicals	80 mancozeb powder +50% carbendazim +chlorbenzuron or cyhalothrin or fenpropathrin	1
	IPM					
The first ten days of Sep Oct, after take off bag	General	Maturation period	Fruit disease	Spraying fungicides	80% mancozeb powder	1
	IPM					
Nov-Dec	General	After fruiting	Apple canker Crossing winter pest	crape off disease spot, smear chemicals, Clean Weeds and leaf	4 thiophanate-methyl ointment	1
	IPM					

Table 10 The date of Yidu city citrus pest mites general and IPM control

Time (Month/Late)	Control	Solar	Phenophase	Target pest	Measures	Chemicals	Concentration	Dose
The last Nov Feb.	General	Winter begins The rains	Stop growth period Flower bud differentiation period	Crossing winter pest disease	Spraying	30% lubricant- Lime sulfur ME	800X	1
	IPM		Field sanitary Irrigation fertilization Pruning					
March	General	Insects awaken Vernal Equinox	Flower bud formation Spring germination period	<i>Panonychus citri</i> McGregor, <i>Eotetranychus kankitus</i> Ehara, Citrus scab	Spraying	5%hexythiazox EC 1.8%AvermectinsEC 70%thiophanate- Methyl WP	2000X 2000X 1000X	1
	IPM		Spraying based on monitoring leaf mites and insects					
April	General	Clear and bright Grain rain	Spring growth period Present bud florescence Profuse flowering period	<i>Panonychus citri</i> McGregor, <i>Eotetranychus kankitus</i> Ehara, Citrus scab, <i>Contarinia citris</i> Barnes, <i>Aleurocanthus spiniferus</i>	Spraying	20% dicofol	20mass/ mu 800X	1
	IPM		Plant weed Predatory mites Light luring moths Yellow plate Spraying based on monitoring leaf mites and insects		Selected pesticide			

Project Document for China dicofol project

May	General	Summer begins Grain buds	Profuse flowering period Spring since shear period Deflorate and fruit drop period	<i>Panonychus citri</i> McGregor, <i>Eotetranychus kankitus</i> Ehara, Citrus scab, <i>Aleurocanthus spiniferus</i> , <i>Unaspis yanonensis</i>	Chemicals application periodically Yellow plate Light luring Spraying based on monitoring leaf mites and insects	20%PyridabenEC 40%ChlorpyrifosEC	1500X 1000X	1
	IPM							
June	General	Grain in ear Summer solstice	Biological fruit drop period Shoot germination period	<i>Panonychus citri</i> McGregor, <i>Eotetranychus kankitus</i> Ehara, <i>Phyllocoptruta oleivora</i> , Leaf-Roller Moth <i>Colletotrichum gloeosporioides</i> (Peng) Sacc.	Chemicals application periodically	1.8%AvermectinsEC 80%DithaneWP 0.3 Azadirachtin	2000X 600X 750 X- 1500 X	1
	IPM							
July	General	Slight heat Great heat	Shoot growth period Phase stability fruit	<i>Aleurocanthus spiniferus</i> , <i>Powdery Mildew</i> , <i>Unaspis yanonensis</i> , <i>Phyllocoptruta oleivora</i> , <i>Phyllocnistis citrella</i> Stainton	Yellow plate luring pest Lighting luring moth Pruning Spraying based on monitoring leaf mites and insects	20%MarshallEC	2000X	1
	IPM							
August	General	Autumn begins Stopping	Early autumn growth germination period	<i>Aleurocanthus spiniferus</i> , <i>Powdery Mildew</i> , <i>Phyllocoptruta oleivora</i> ,	Chemicals application periodically	80%DithaneWP 20%MarshallEC	600X 2000X	1

Project Document for China dicofol project

	IPM	the heat	Fruit expansion period	<i>Phyllocnistis citrella</i> Stainton , <i>Colletotrichum gloeosporioides</i> (Peng) Sacc	Yellow plate Light luring Pruning		
Sep	General	White dews Autumn Equinox	Fruit expansion period Start flower bud biological differentiation period	<i>Oraesia emarginata</i> Fabricius, <i>Phyllocoptruta oleivora</i> , <i>Panonychus citri</i> McGregor, <i>Aleurocanthus spiniferus</i> , <i>Unaspis yanonensi</i> , <i>Colletotrichum gloeosporioides</i> (Peng) Sacc, <i>Phyllocnistis citrella</i> Stainton	Chemicals application periodically	20mass/ mu 800X	1
	IPM				Light luring Yellow plate Spraying based on monitoring leaf mites and insects	5%hexythiazox EC 1.8%AvermectinsEC	2000X 2000X
Oct	General	Cold dews Hoar-frost falls	Flower bud biological differentiation period Fruit mature period	<i>Oraesia emarginata</i> Fabricius, <i>Phyllocoptruta oleivora</i> Stainton , <i>Panonychus citri</i> McGregor	Chemicals application periodically	20mass/ mu 800X	1
	IPM				Yellow plate Light luring Spraying based on monitoring leaf mites and insects	5%Hexythiazox, nissorun EC 30% Spraying oil Lime sulfur ME	2000X 800X

Table 11 General calendar for cotton pest mite occurrence in Zhanhua City and IPM control

Time (Month/Late)	Control	Growth duration	Target pest	Measure	Chemicals	concentration	Times
November	General	-		-	-	-	-
	IPM	Crossing winter insect and disease		Field sanitary Irrigating in winter, turn up in spring and clean up weed			
April	General	Pest in seedling stage, stinkbug		Dipping Bt cotton seeding with chemical	75% Phorate EC	125X Dipping 24h	1
	IPM			Dipping seed with chemicals, capsule seed Cover with plastic Monitoring leaf mites and insects	40 carbendazim WP 70% Thiophanate-methyl WP	130X dipping 4h 5kg/3mu	1
May, seeding	General	stinkbug Underground pest Cotton aphid Leaf mite	cotton soreshin Cotton anthracnose Cotton root rot Cotton Red Spider Cotton Aphids Cotton plant-bugs	spraying	73% propargite EC 10 imidacloprid WP or 40 omethoate EC	3000X 10ml/mu 40ml/mu	2
	IPM			spraying toxic bait Monitoring leaf mites and insects	10 imidacloprid WP 5 phoxim GR 40 omethoate EC 1.8 abamectin EC 15 pyridaben EC	10ml/mu 200ml/mu 40ml/mu 10ml/mu 20ml/mu	1 1 1 1
				spraying	30 imidacloprid EC 1.8 abamectin EC bag/mu 20 dicofol EC 0.2 emamectin benzoate EC 4.5 cyhalothrin EC	15ml/ mu 10ml/ mu 200ml/ mu 40ml/ mu 50 ml/ mu	1 2
				Yellow plate spraying Hang lamp Monitoring leaf mites and insects	25.25 chlorpyrifos+cyhalothrin ME 5% regent SC	45ml/mu 50mu/light 1000X	1
June, alabastrum period	General	Cotton aphid The second cotton worm Leaf mite	Cotton Red Spider Cotton Aphids Cotton plant-bugs Cotton Thrips Cotton Bollworm				
	IPM						

Project Document for China dicofol project

July-August, Boll period	General	Leaf mite The third cotton worm	Cotton plant- bugs Cotton Red Spider Cotton Bollworm Cotton Thrips Cotton Aphids Cotton Fusarium wilt	spraying	1.8 abamectin EC or 15 pyridaben EC 20 dicofol EC 4.5 cyhalothrin EC	10ml/ mu 200ml/ mu 200ml/ mu 50 ml/ mu	2
	IPM				1.8 abamectin EC 15 pyridaben EC 25.25 chlorpyrifos+cyhalothrin ME +10 imidacloprid EC 15% Anda SC	10ml/mu 20ml/mu 45ml/mu 10ml/mu 4000X	2 1 1
Sep, fusule period	general	Stinkbug The forth cotton worm	Cotton plant- bugs Cotton Red Spider Cotton Bollworm	spraying	2.5 cyhalothrin EC 25.25 chlorpyrifos+cyhalothrin ME 15% Anda SC	2000X 45ml/mu 4000X	2 1
	IPM						
May—August	general						
	IPM			Farming operation	“check, insert, pick, break, beat”		-

During the implementation of IPM technologies, communication among farmers will be held periodically. Experts will join the communication and give comments. In addition, a IPM impact assessment plan will be developed and implemented to evaluate the positive and negative impacts, local and global benefits.

Project Document for China dicofol project

7.5 Public awareness of IPM and Stockholm Convention raised

The main labor is women and elders in agriculture in China because the young people get into cities for jobs. So most of farmers are poor educated. They cultivate depend mainly on experience. They know well about traditional chemical pesticides and worry about the risk that new variety might bring. Because of the lack of systemic monitoring technology, the control against pests and diseases depend on spray chemicals regularly. This causes wastes of large amount of chemicals and the pollution to the environment.

This project will disseminate the hazards that DDT can cause and the relation between dicofol and DDT via broadcast, television, mobile, hot line, newspaper, post, etc. Strengthen the public understanding to POPs. Let the official, manufactures and dealers of pesticide, farmers, dealers and consumers of agriculture end-products to understand the potential risk of dicofol and DDT, and to reject the use directly or indirectly dicofol and DDT related products.

7.6 Manufactures and research institutes motivated to improve alternatives that are more environmental friendly and cost-effective

In order to sustain the development of the project and attract more enterprises to take part in the development of alternatives, the Project will organize the experts to draft a plan for the promotion of the alternative development and organize a mobilization meeting to attract the participation of enterprises.

The alternatives that produce by the enterprises that voluntary to participate in the Promotion Plan develop will be evaluated by small scale pilot planting in demonstration area for the economic feasibility, effectiveness and the impact to the environment. The recommended alternatives will be disseminated as candidates alternatives so that to promote the development, enlarging production of the alternatives.

8. Expected global and local benefits

As a typical persistent organic pollutant, DDT as well as its metabolites, is highly toxic, hard to degrade and persistent, can spread through atmosphere, biosphere and ocean current, and thus have a direct or potential harm to the global ecosystem and human health.

The implementation of this project will eliminate the release of DDT into environment through production and consumption. The benefits from the elimination will include:

- a) Reduction of DDT and dicofol level in air, water, soil and agricultural products and improvement of the local and global environment;
- b) Improvement of farmers' knowledge of IPM, their acceptance on the concept even in control of other pests, and cultivation techniques which will reduce the use of pesticide and sustain the development of the relevant crop production;
- c) Monitoring and predicting system will be set up in demonstration countries, which will promulgate not only mite occurrence but also other diseases and insects information, as well as new pest management technologies. Chemical application will be reduced, which will benefit local farmers and environment, as well as national and globe environment;
- d) Promotion of the production and consumption of environment friendly alternatives;
- e) Enhancement of public awareness in environmental protection;
- f) Increase of the farmers' income from the higher quality of the products because of adopting IPM technologies.

Project Document for China dicofol project

Annex III

Program for Closure of Non-closed Dicofol Production Plants

Background

Overview of dicofol production in China

Dicofol is one kind of the key acaricides to kill egg, young mites and adult mites with broad spectrum, cheap, excellent efficacy and is widely used for controlling mites in agriculture. At present, the scope of distribution and use of dicofol covers most provinces in China, as it is suitable to grow income-generating crops. There had been 6 enterprises that produce dicofol technical materials and 116 enterprises produce dicofol formulations. Dicofol is mostly used on cotton, apples and citrus crops. Other crops include strawberries, mint, beans, peppers, tomatoes, pecans, walnuts, stonefruit, cucurbits, and non-residential lawns/ornaments.

Based on the available data from 2000 to 2004, total annual domestic agricultural usage of dicofol averaged 3,500 MT of active ingredient and 4,000 tons of DDT as intermediate, half of which was from the non-closed system. Now, there are two registered producers for technical grade dicofol in Hebei and Shandong provinces, while the consumption distributed throughout the mite-affected provinces of China. DDT used in their production was purchased from Tianjin Chemical Engineering Co. Ltd.

The present process for manufacturing dicofol uses DDT as the starting material. The DDT, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane, $(p\text{-ClC}_6\text{H}_4)_2\text{CHCCl}_3$, or $\text{C}_{14}\text{H}_9\text{Cl}_5$ were manufactured by the reaction between chlorobenzene and trichloro-acetaldehyde in the presence of sulphuric acid. DDT is dehydrohalogenated with alkali to afford 1,1-bis(chlorophenyl) dichloroethylene, which is chlorinated to afford 1,1-bis(chlorophenyl)-1,2,2,2-tetrachloroethane. It is then converted to the desired product, 1,1-bis(chlorophenyl)-2,2,2-trichloroethanol or dicofol by placing in a hydrolysis reaction vessel with p-toluene-sulfonic acid, sulfuric acid and water.

According to the requirement of the Stockholm Convention, use of DDT as intermediate in non-closed system is not an acceptable use. Moreover, the production of dicofol caused the release of about 1,000 MT DDT containing wastes and 10% by weight of DDT "impurity" in the final products, releasing hundreds tons of DDT impurity to the environment during the spraying of dicofol in 23 provinces in China. In order to minimize the release and potential risk of DDT from dicofol production and usage, closure of non-close dicofol production facilities was identified as a higher-priority component in the whole strategy.

Zhangjiakou Greatwall Pesticide & Chemical Group

Zhangjiakou Greatwall Pesticide & Chemical Group (Zhangjiakou), located at Shacheng town, Zhangjiakou city of Hebei province, is a state-owned large enterprise, near the upper reaches of the Guantian reservoir, which is an important source of drinking water for Beijing, the capital of China. Zhangjiakou began its DDT and dicofol production in 1970 and 1978 respectively. It had been using self-produced DDT as raw materials for dicofol production until it stopped its DDT production in 1983. Then Zhangjiakou purchases technical DDT from Tianjin Chemical Engineering Co. Ltd. Its production ability of 20% emulsifiable dicofol solution is about 2000 ton/a in recent years.

Zhangjiakou has the pesticide registration certificate (issued by Institute for the Control of Agrochemicals, Ministry of Agriculture) and manufacturing license (issued by National Development and Reform Commission) of dicofol technical, emulsifiable formulation and suspension.

There are mainly five procedures in the dicofol production: smelting, chloridizing, hydrolyzing, refining and emulsification making. Waste acid and wastewater produced in the procedure 1, 2, 3 and 5; and waste gas produced in procedure 4, which could be absorbed by an absorbing tower and sold out. Some solid contaminants produced during the equipment maintenance.

Project Document for China dicofol project

In Zhajiakou, the large volume of liquid wastes produced in the DDT and dicofol production were not properly treated in the past years from lack of management and suitable technologies. About 400m³ (500 tons) waste liquid with a DDT concentration higher than 0.16g/L was collected in a glass fiber reinforced plastic pool and 20 tons of contaminated materials with a DDT content about 0.56~1.65ppm dumped in the northwestern of the plant. The distance from the dumping site to the nearest farmland is only 600 meters. Moreover, the scatter, leakage and evaporation of DDT during the dicofol production were also not neglectable. The DDT content on the ground surface in the storage warehouse is as high as 0.36g/g, which preliminarily revealed that the storage house, workshop and waste sites were highly polluted.

Zhangjiakou has 3 sets of production lines for dicofol, consisting of mainly the following facilities: 3 smelters (2500 L), 3 chloridization kettles (1500 L), 3 graphite condensers (1500 L), 3 refining kettles (10 000 L), 4 dicofol TC containers (30 000 L), 2 dicofol EC containers (50 000 L) and 1 package machine (10 000 L). All these equipments should be regarded as contaminated facilities because they contact with DDT or dicofol in the production process.

Zhangjiakou will prepare for changing into the PVC pipeline production(5000 t/a).

Shandong Dacheng Pesticide Co. Ltd

Shandong Dacheng Pesticide Co. Ltd (formally Zhangdian Pesticide Factory, Dacheng for short,) located at Zhangdian district of Zibo city, Shandong province, established in 1949, is a state owned enterprise engaged in the production of pesticide and chloral chemical. It is also the leading pesticide manufacturer in Shandong province. Among China's first test-run stock enterprises, the "Dacheng stock" has been in the Shanghai Stock and Securities Exchange since 1995. Dacheng began its DDT production in 1968, enlarged the production capacity to 2500 tons/a in 1982 and stopped in 1983 according to the instruction of State Council of China. The factory is in the Southeastern of the urban district. Some of the original workshops were modified as mechanical repair & assemble workshops; some were changed as dicofol workshops. Dacheng's dicofol production began in 1979 and enlarged to 3000 t/a emulsifiable dicofol solution in 1981. After 1983, Dacheng purchase its DDT technical from Tianjin Chemical Engineering Co. Ltd. Its production ability of technical grade is about 1600 ton/a in recent years.

Dacheng has the pesticide registration certificate and manufacturing license of dicofol products(XK13-200-00449) for both the technical grade product(PD87106) and emulsifiable formulation(PD85126-7).

Dacheng has 4 sets of production lines and the dicofol production technology is generally same as the one in Zhangjiakou including: 4 smelters, 4 chloridization kettles, 4 graphite condensers, 4 refining kettles, 6 dicofol TC containers, 4 dicofol EC containers and 2 package machine. Moreover, it invested 6.45 million for the modification of alkaline hydrolysis and purification processes to improve the transformation ratio of raw material and reduce the DDT content in the final dicofol products.

In Dacheng, the wastewater containing little DDT preliminarily precipitates and neutralized by caustic alkali. Then it flows to the main of the sewage disposal plant of the factory. The sediment of the precipitation pool (5.5m×2.5m×1.5m) was desilted annually, which was disposed as industrial wastes. Comparing with Zhangjiakou, there are few solid wastes accumulated in Dacheng. Moreover, the floor of the dicofol workshop covered by granite is impermeable. Therefore, the probability of the pollution of underground water is relatively small.

Dacheng will prepared for changing into the glyphosate production (50000 t/a)

Without the requirement of Stockholm Convention and this project, Zhangjiakou and Dacheng will continue their dicofol production in non-closed system using DDT as raw materials for the mite control on crops. With the increase of the cotton, apple and citrus production, the production of dicofol in the open system is likely to increase to satisfy demand. The increase is also to enlarge the DDT and other high toxic waste emission during the production process.

Project Document for China dicofol project

Barriers:

The profit loss from the closure of dicofol production and the investment for production line change is a body blow to enterprise owners. As for Zhangjiakou the output of 20% emulsifiable dicofol is about 2000 tons/a and the selling profit is about 4 million per year. Dacheng has a bigger output about 8000 tons/a, and the profit loss is about 16 million per year from the closure of dicofol production. Zhangjiakou plans to change the production as PVC pipeline after the closure of dicofol production line, which need an investment of about 44 million. Dacheng wants to change the production line as glyphosate, the investment need is about 71 million.

The job and salary loss of the workers will also arouse serious social problems in the local communities. There are about 52 and 98 workers supposed to lose their jobs directly from the closure of dicofol production in Dacheng and Zhangjiakou, not considering the unemployment of other plants caused by the closure of the two enterprises, because they produce emulsifiable products by technical grade dicofol bought from these two enterprises. The job loss will directly reduce their income and make them economically embarrassed, as most of the workers are not so rich, relying only on their salaries. In addition, their re-employment is not an easy task for the local communities.

The pollutants and contaminated materials' cleanup is a laborious and time consuming activity. DDT pollutants and contaminated wastes are hazardous wastes according to the related regulations in China. The cleanup, collection, transportation, storage and disposal are complex with high risks and the treatment and disposal cost is very high.

Activities:

One of the key elements of the project is to phase-out the production and use of DDT and dicofol. This can only be achieved through permanent closure of all the non-closed dicofol producers in China. After the closure, DDT contaminated workshops, equipments and accessories should be cleaned up as soon as possible to prevent the risk to the local environment and human health. The production change in Zhangjiakou and Dacheng should be speed up as well.

This component for closure of the two non-closed dicofol production lines in Zhangjiakou and Dacheng mainly includes six activities:

1. Preparation work and action plan for production closure, including:

Development of two technical guidelines and an action plan to cover the entire spectrum of activities to constitute the Environmentally sound management (ESM) of DDT contaminated sites and disposal of hazardous wastes containing DDT. During the preparation, related technical guidelines of BAT/BEP and 'Basel convention' should be considered and followed according to the actual situation.

- ◆ A guideline for DDT decontamination/cleanup of equipment/workshop
- ◆ A guideline for ESM of contaminated sites;
- ◆ An action plan for production line closure and waste cleanup

Re-employment training workshop for the 150 unemployed workers; safe production and waste management are also important contents for training.

2. Implementation of the closure, including:

- 1) A coordination conference attended by central and local government departments, enterprises and stake holders concerning dicofol production will be held to implement the closure of dicofol production smoothly;
- 2) Promulgation of prohibition instruction for the non-close dicofol production, including at least the cancellation of the Registration certificate and Manufacturing license of dicofol technical, formulation and suspension, and the seal-up of production district;

Project Document for China dicofol project

- 3) Seal-up of the non-closed dicofol production workshop and district, including the closing down of major manufacturing equipment; cutting down the power, water and steam supply for the facilities of dicofol and sealing up the workshops, warehouses and district concerned.
3. Cleanup of DDT contaminated equipments/workshop/waste. Zhangjiakou and Dacheng have all the production facilities for the production of technical and emulsifiable dicofol products, and the related DDT contaminated workshops, warehouses, equipments, residuals, liquid and solid waste in the original sites. Moreover, Zhangjiakou has also the DDT production workshops. So the cleanup process consists of the following activities:
 - 1) Trainings:
 - Training workshop for DDT waste/equipment cleanup;
 - Training workshop for ESM of DDT contaminated sites;
 - 2) Cleanup of the original workshops for DDT and dicofol production; Since the ground and wall of the workshops were covered by cement layer so the pollutants were not supposed to come into the deep layer, which could be decontaminated by shoveling and re-painting. The contaminated internal layer of the wall and the ground would be removed at first; then re-covered by cement and re-painting. The external wall would be washed and re-painted. The total area to be cleaned up is about 24000 M² and the residual produced during the cleanup process is DDT contained waste.
 - 3) Cleanup of equipments for dicofol production; For each of the dicofol production line, there are mainly 7 sets of primary devices for the production of dicofol in Zhangjiakou and Dacheng, each of them consisting of a 2500L smelter, a 1500L chloridization kettle, a 1500L hydrolysis kettle and a 10 M³ refining kettle at least. Dimethylbenzene and steam would be needed for the complete washing of these devices. The solvent after the washing would be stored in plastic barrels. All the steam and waste gas produced in the process would be cleaned by filtration or absorption.
 - 4) Cleanup of the pipelines and accessorial equipments; the pipelines and accessorial equipments including the condensers and pumps would be dismantled then washed separately.
 - 5) Cleanup baseoil and emulsifiable solution containers; the residual liquid in the containers should be removed at first, then be blown off by high-pressure steam, and interchanged by high-pressure air for several hours. After the pre-treatment, worker enters into the vessels to clean the surface of the containers. The residual produced during the cleanup process is DDT contained waste.
 - 6) Waste package and temporary storage; It was estimated there would be 700 tons of DDT contaminated liquid and solid wasted, including about 500 tons of DDT wastewater, 20 tons of DDT contaminated residual and slag, 180 tons waste solvent and contaminated materials produced in the cleanup process, which should be packed and temporarily stored.
 - 7) Monitoring during the cleanup process; 140 samples would be taken and analyzed in the whole cleanup process.
4. DDT waste transportation and disposal; Considering the high environmental and health risk, temporary storage is not considered as a good solution. In addition, waste exportation for final disposal is not a cost-effective and environmentally sound manner since China has the ability to treat DDT wastes. About 700 tons DDT waste will be disposed in the qualified hazardous waste treatment centers to ensure DDT and other persistent organic pollutant is disposed of in an environmentally sound manner, taking into account of the international rules, standards, and guidelines including the technical guidelines of Basel Convention and BAT/BEP and relevant global and regional regimes governing the management of hazardous wastes. Although the high temperature incineration by

Project Document for China dicofol project

rotary kiln or cement is the major method for disposal of hazardous wastes, non-combustion technologies are also possible alternatives. The related waste should be transported to certified hazardous waste treatment facilities and disposed by operators licensed for the treatment of chlorine pesticide related wastes (HW04).

5. Carry out site evaluation; develop the measures to be needed for control the risk of the contaminated sites and conduct institutional control measures as early as possible.
 - 1) Site monitoring and environmental risk assessment;
 - 2) Develop measures to be needed for risk control or elimination.
6. Facilitate implementation of the institutional control measures to ease the environmental impact. The institutional control measures will be submitted to the local authorities and EPBs to promote their actual application as early as possible.

Social Impact Analysis

Dicofol is classified by the World Health Organization as a Class III, 'slightly hazardous' pesticide, its acute oral LD50 (the dose required to kill half a population of laboratory test animals) for dicofol is 595-690 mg/kg for rats. Like many insecticides and acaricides, dicofol is a nerve poison. The exact mode of action is not clear although in mammals it causes hyperstimulation of nerve transmission along nerve axons (cells). This effect is thought to be related to the inhibition of certain enzymes in the central nervous system. Moreover, the DDT used as raw material and remained as residual will arouse serious health risk for the workers and end users.

Closure of non-closed dicofol production will permanently phase out about half of the dicofol products on the market and reduce the DDT production accordingly. In addition, it will promote the research, production and use of alternatives that are more effective and environment friendly. Therefore, the local, national and global environmental benefits will be the direct outcome of the related activities. However, the closure will also arouse some negative impacts to the local communities, workers, and plant owners.

- a. Positive influences; following are some positive influences from closure of non-closed dicofol production:
 - 1) Directly decrease the dicofol production, use and pollution and speed up the dicofol and DDT phase out, about 2,800 MT/a of DDT production and consumption will be eliminated correspondingly;
 - 2) Decrease the environmental emission from dicofol and DDT production, distribution and usage, about 1,000 MT/a of waste containing DDT reduced correspondingly;
 - 3) Reduce approximately 350 MT/a of DDT released to environment via the use of dicofol with DDT impurity;
 - 4) Improve the local, national and global environmental and ecological quality;
 - 5) Improve the quality and reduce the toxic residual of the agricultural products;
 - 6) Give new opportunities for the plant owner to do the technology reform and make their products more competitive;
 - 7) Decrease the human health risk caused by the production, distribution and usage of dicofol and DDT.
- b. Negative impacts, following are some negative impacts aroused from closure of non-closed dicofol production:
 - 1) To the worker of dicofol and DDT workshop

Project Document for China dicofol project

- Lose their salaries (salaries are the major family income for most of the workers)
 - 20 management staff(2000 /m/p) and 80 workers(1500 /m/p) for dicofol production in Shandong Dacheng Chemical Co. Ltd
 - 50 staff (1500 /m/p)for the dicofol production in Zhangjiakou Pesticide & Chemical Co. Ltd.
 - Pressure from the re-employment
 - Re-employment is very difficult in China now, especially for the less developed areas.
 - Most of the workers with little education will face more challenges.
- 2) To the company owner
- Lose income from dicofol's sale
 - Dicofol production and sale still takes very important role in the total annual income of Zhangjiakou and Dacheng, the closure will reduce their profits in a short term directly.

In the implementation of PDF-B project and public awareness enforcement, the plant owners agree to bear the profit loss, salary loss and investment for production change.

Risks:

Equipment dismantling, cleanup and waste treatment technology for closure of dicofol production does not meet performance requirements.

The risk will be addressed through the selection of a recognized waste management company and the use of a proven approach for handle DDT and dicofol contaminated wastes. In addition, active supervision over dismantling and waste disposal will also mitigate this risk.

Incremental Cost Analysis:

Baseline Scenario The baseline scenario reflects the continued production and usage of dicofol for mite prevention and control on cotton, apples and citrus crops. China is producing around 3,500 tons of technical grade dicofol and 4,000 tons of DDT as intermediate. Half of the products were from the non-closed system at Zhangjiakou Greatwall Pesticide & Chemical Group and Shandong Dacheng Pesticide Co. Ltd, while the consumption distributed throughout the mite-affected provinces of China. With the increase of the cotton, apple and citrus production, the production of dicofol in the open system is likely to increase because of dicofol is of the broad spectrum, cheap, excellent efficacy and widely used for controlling mites in agriculture. The owners of the non-closed dicofol system and DDT production are also likely to modify and enlarge their capacities correspondingly to satisfy demand.

GEF Scenario Regarding non-close dicofol production using DDT as intermediate, the project will stop production and physically close and clean up both the two dicofol manufacturing facilities at Zhangjiakou Greatwall Pesticide & Chemical Group and Shandong Dacheng Pesticide Co. Ltd to achieve a elimination of 2,800 MT/a of DDT production and consumption. It will also reduce about 1,000 MT/a of waste containing DDT and 350 MT/a of DDT released to environment via the use of dicofol with DDT impurity.

Incremental Cost Analysis The non-close dicofol production closure is described under component 3, please see the detail in the 'Activities' section above. The baseline and GEF Alternative information for the non-close dicofol is summarized in the following table:

Project Document for China dicofol project

Annex IV

Program for Optimization of Existing Closed-system Dicofol Production

Background

According to the requirements of the Stockholm Convention (the Convention thereafter) on Persistent Organic Pollutants, China is obliged to phase out POPs. DDT is an organochlorine pesticide persistent in the environment and listed as one of the 12 POPs in Convention. However, The dicofol production via DDT in a closed-system site is allowed by the Convention. Such production and use shall cease after a ten-year period, unless the party concerned submits a new notification to the Secretariat of the Convention, in which case the period will be extended for an additional ten years. DDT will be stopped after 2009 in non-closed system and the monitoring of dicofol production in closed system will be strengthened.

Although dicofol is produced via DDT, DDT will thus release to the environment. As a cheap acaricide with broad spectrum and excellent effect, dicofol has been used for 50 years, until the extension of its alternatives for mites control in agriculture. However, dicofol production will maintain for several years in the future. In order to minimize the release and potential risk of DDT, dicofol should be produced in a closed system production process and a serious of management and DDT control measures should be carried out.

In China, during the PDF-B stage of this project, through the improvement of production technology, Jiangsu Yangnong Chemical Group (hereafter Yangnong Group) became the only dicofol production plant, which met the requirements of the closed system production process listed in the Convention.

The dicofol production process in Yangnong Group was built in 1976. With development in 1970s and 1980s, Yangnong Group became the biggest dicofol production enterprise in China. In 1983, when DDT was banned as the agricultural pesticide, Yangnong stopped its production. In recent years, Yangnong has spent around 70 millions RMB for the improvement of the dicofol production technology. As a result, DDT only present as the intermediate in the tube and kettle during the dicofol production. The transmission efficiency of DDT to dicofol increased greatly from 80% in past to 95% today. Wastes from the production are well managed and treated with special measures. (Fig. 1 shows the dicofol production process in Yangnong Group)

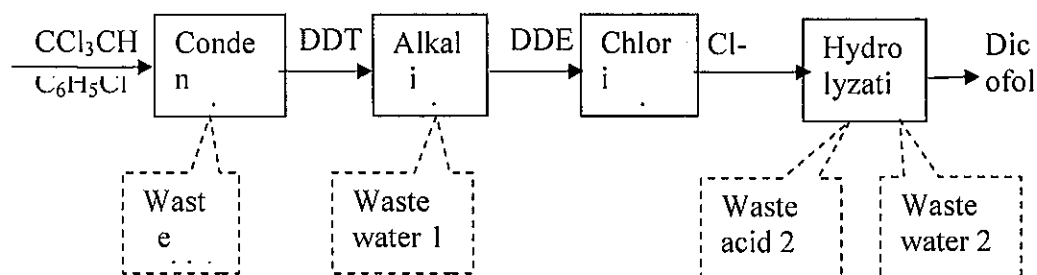


Figure 1. The dicofol production process

Dicofol is produced from trichloroacetaldehyde (CCl_3CHO) and chlorobenzene ($\text{C}_6\text{H}_5\text{Cl}$) through condensation, alkalization, chlorination and hydrolyzation processing. First, condensation reaction of CCl_3CHO and $\text{C}_6\text{H}_5\text{Cl}$ yields DDT in the presence of sulfuric acid. DDE is produced during the alkalization process from DDT and transferred into chlorination kettle and mixed with chlorine. Afterward the chloridized DDT is put into hydrolyzation kettle and reacts with H_2O to produce Dicofol. After purification, Dicofol can be packed and sold at markets. The waste acid and wastewater in the process are treated with special measure to minimize the influence to the environment.

Project Document for China dicofol project

In Figure 1 it shows that DDT remains in the waste acid, wastewater and the dicofol product. In addition, the workshop air may contain DDT due to the leakage during the production process. Thus, in order to estimate the environmental risk of dicofol production, samples were collected in Yangnong Group in PDF-B stage. The samples included waste acid 1 (mainly H₂SO₄ from the condensation kettle), wastewater 1 (from the alkalization kettle), waste acid 2 (sulfonic acid from the hydrolyzation kettle) and wastewater 2 (from the hydrolyzation kettle). The samples were collected to estimate the DDT in the waste. Five workshop air samples were collected following the “Sampling criterion for hazardous substances in the air of the workshop (GBZ 159 2004)” to estimate the workshop air risk. The workshop air samples are as follows: Air1 - outside the condensation kettle, Air2 - between the condensation kettle and alkalization kettle, Air3 - inside the office room, Air4 – outside the alkalization kettle, Air5 –around the outlet of the waste acid the wastewater.

The DDT results are as follows in Figure 2.

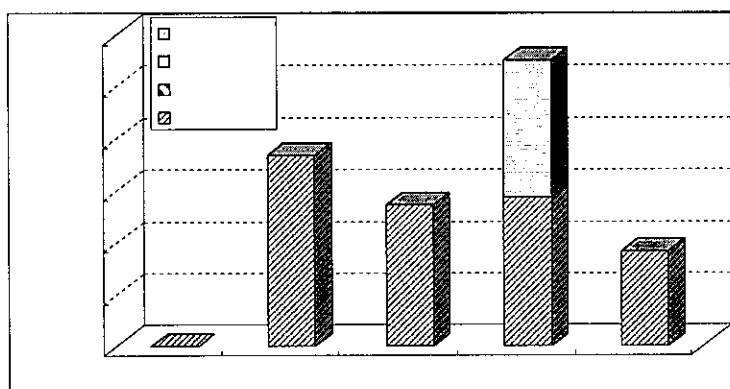


Figure 2 DDT results in the workshop air samples

In the five workshop air samples, p,p'-DDE was the main congener, while only in the sample Air4 p,p'-DDT was detected. The DDT levels in these samples were very low. Especially for p,p'-DDT, the highest level was only 264 ng/m³ in sample Air4 outside the alkalization kettle, while the Chinese standard (GBZ2-2002) for p,p'-DDT in the workshop is 6 mg/m³. It shows that the production kettle and connection tubes are good enough to prevent the DDT leakage during the production.

Table 1 shows the DDT levels in the wastewater and waste acid samples.

Table 1 DDT levels in the samples (mg/L)

Site	p,p'-DDE	p,p'-DDD	o,p'-DDT	p,p'-DDT	∑DDT
Waste acid 1	993	105	536	2492	4130
Waste acid 2	851	53.6	377	156	1437
Wastewater 1	141	<1.0	8.71	5.07	155
Wastewater 2	379	10.3	41.2	7.23	438

A standard value of “low persistent organic pollutants” (50 mg/kg) for p,p'-DDT pollutants was given by the COP3 meeting. In this dicofol production process, the highest levels (2492 mg/L, below the standard)

Project Document for China dicofol project

of p,p'-DDT was detected in sample waste acid 1 collected from the condensation kettle. In the condensation Kettle, the CCl_3CHO condensed with $\text{C}_6\text{H}_5\text{Cl}$ to produce p,p-DDT.

In addition, DDT residue were analyzed in some batches of dicofol products. The results show that DDT in all batches of the dicofol product was below 0.1%, the domestic and international dicofol product standard.

In this dicofol production process, DDT only present in the reaction kettle and its levels in dicofol product, wastewater and waste acid are below standards. It meets the requirements of the closed system dicofol production process.

As a typical organo-chlorine chemical production, PCDD/Fs may release from the dicofol production. During the PDF-B phase of this project, PCDD/Fs were also analyzed in the dicofol product, the wastewater and the waste acid. 0.17 ng TEQ/L of PCDD/Fs was in the waste acid 1 and the waste acid 2; while 0.005 pg/g and 0.093 ng/g were in the wastewater 1 and the wastewater 2, respectively. PCDD/Fs in dicofol product were 0.084 ng/g, which were similar to PCDD/Fs level in p-dichlorobenzene product (0.04 ng/g) listed in the Dioxins toolkit 2006.

Based on the above POPs analysis results, a workshop for the evaluation on the closed system dicofol production in Yangnong Group was held in 2007. The participants were experts from the State Environmental Protection Administration, Pesticide Association, Chemical Association, Research Center for Eco-Environmental Sciences of Chinese Academy of Sciences and etc. The management on dicofol production in Yangnong Group and the above analysis results were presented in the workshop, so the consensus was that the production technology in Yangnong Group met the requirements of the Convention.

Risk

Although the production technology of dicofol in Yangnong Group meets the requirement of the closed production of the Convention, there are still the release of DDT and other pollutants in the wastewater and waste acid. DDT pollution may occur if there were accidents in the dicofol production or under poor operation. In order to minimize the environmental risk during the dicofol production, the waste acid, the wastewater, the dicofol product and the workshop air should be under control. In this project, a framework for management will be built so as to better manage the wastewater and the waste acid.

Activities

The component for optimization of existing closed-system dicofol production includes three activities:

4.1 Optimization of existing closed-system dicofol production

4.1.1 Improve the operational rules and skills of Yangnong pesticide Co. Ltd closed-system dicofol production, in particular the rules and skills with regard to the management of the wastewater and the waste acid released from the dicofol production. The operational rules will aim at the special roles of the managers, the technicians and the workers and a measures for emergency in case of accidents should be developed as part of the operational rules.

4.1.2 Build up regular record and data report mechanism that satisfactory to CIO and submit such record to CIO periodically.

4.1.3 Trainings for enterprises and stakeholders about above mentioned operational rules and the requirement on record and data report mechanism.

4.2 Develop and carry out periodical monitoring and inspection plans.

4.2.1 Set up a framework on periodical supervision and monitoring of DDT in the workshop of dicofol production facility, the wastewater, the waste acid dicofol products. In the framework, the DDT

Project Document for China dicofol project

and other POPs will be monitored in each batch of dicofol product by Yangnong Group, and DDT in workshop air, the waste acid and the wastewater by Yangnong Group by quarters.

This framework will be built by cooperation among the environmental experts, the managers and the technicians of the enterprises. In the framework, the analysis items will include p,p'-DDT and other DDT congeners.

As the dicofol production is very complicated, many organo-chlorine chemicals are formed during the production. These chemicals may interfere the analysis of dicofol product and waste. The analytical procedure used in PDF-B phase was too complicated to operate for enterprise's quality control and the relevant agencies. So, the economic and fast analysis methods of DDT and other POPs for dicofol product, wastewater and waste acid in the dicofol production will be explored under the guidance of the domestic and international guideline.

4.2.2 Consult with enterprise and local EPB on the framework on periodical supervision and monitoring of DDT.

4.2.3 Periodical monitoring of the DDT or other POPs in the dicofol product, the wastewater, the waste acid and other pollutants.

4.2.4 Select qualified firm of institute to carry out independent monitoring the potential DDT release at least twice per year, for inspection and verification the eligibility of the dicofol product in Yangnong Group.

Social Impact Analysis

As a typical POPs, DDT as well as its metabolites, is highly toxic, hard to degrade and persistent, can spread through atmosphere, biosphere and ocean current, and thus have a direct or potential harm to the global ecosystem and human health.

The implementation of this project will eliminate the release of DDT into the environment. The capacity of dicofol in Yangnong Group was about 2000 tons in recent years. In the past, the transmission efficiency from DDT to dicofol was only 80%, which means that about 500 tons of DDT (20% of the DDT materials) were released to the environment via wastewater, waste acid and dicofol product. During the PDF-B phase of this project, through the improvement of dicofol production technology the transmission efficiency from DDT to dicofol, the release of DDT via production process and spraying has been reduced remarkably; The investigation on the wastes and dicofol product show that as of today, only few DDT releases to environment in the closed system dicofol production process of Yangnong Group, and the residues of DDT existing in dicofol could meet the relevant requirements of China and FAO.

The safe manage of the wastes for the dicofol production will dramatically reduce DDT release to the soil and water,, which will generate great health benefit to the local community. Although DDT concentration in the wastewater and the waste acid from Yangnong Group is very low, DDT concentration may increase in the wastewater and the waste acid in case of emergency and maintenance, while a good framework on the waste management will prevent from it. In addition, the framework could also minimize the environmental risk of the wastes emitted from the dicofol production.

The trainings held in this project will raise the public awareness on environment protection. Well operation in the dicofol production will decrease the probability of accident and DDT release to the local environment.



27 October 2008

Dear Mr. Zou,

**Subject: Improvement of DDT-based Production of
Dicofol and Introduction of Alternative Technologies Including
IPM for Leaf Mites Control in China**

I am pleased to attach herewith three copies of the above-mentioned Project Document for your kind support to get them signed by the Government Coordination Agency, the Ministry of Finance, for the project.

We would be most grateful if you could forward the three signed copies to the Ministry of Environmental Protection of China (MEP), China, for their signature as the Project Implementing Partner. UNDP will then approve the project document and we will send to each party a fully-signed copy for record.

Thank you for your cooperation.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'Subinay Nandy', written over a horizontal line.

Subinay Nandy
Country Director

Mr. Zou Ciyong
GEF Operational Focal Point in China
International Department
Ministry of Finance

CC: Mr. Yu Lifeng
Deputy Director General
Foreign Economic Cooperation Office
Ministry of Environmental Protection



Annual Work Plan

China - Beijing

Award ID: 00050191

Award Title: 3345 POPS FSP DICOFOL

Year: 2009

Report Date: 30/11/2008

Project ID	Expected Outputs	Key Activities	Timeframe		Responsible Party	Planned Budget				
			Start	End		Fund	Donor	Budget Descr	Amount US\$	
00061862	3345 POPS FSP DICOFOL	1.capacity build & policy ma 2.IPM demonstration progr 3.closure of dicofol productid 4.optimiz dicofol production 5.monitor and evaluation pla 6.national replication progr 7.project management			CPR-State Environmental Protec	62000	GEFTrustee	71300	Local Consultants	55,350.00
					CPR-State Environmental Protec	62000	GEFTrustee	71600	Travel	2,400.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	106,350.00
					CPR-State Environmental Protec	62000	GEFTrustee	72400	Communic & Audio Visual Equip	155.00
					CPR-State Environmental Protec	62000	GEFTrustee	74100	Professional Services	3,000.00
					CPR-State Environmental Protec	62000	GEFTrustee	74500	Miscellaneous Expenses	143.00
					CPR-State Environmental Protec	62000	GEFTrustee	71200	International Consultants	38,438.00
					CPR-State Environmental Protec	62000	GEFTrustee	71300	Local Consultants	22,062.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	1,298,892.00
					CPR-State Environmental Protec	62000	GEFTrustee	71200	International Consultants	10,000.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	706,530.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	101,550.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	66,250.00
					CPR-State Environmental Protec	62000	GEFTrustee	74500	Miscellaneous Expenses	750.00
TOTAL										2,703,683.00
GRAND TOTAL										2,703,683.00



Annual Work Plan

China - Beijing

Award Id: 00050191

Report Date: 30/11/2008

Award Title: 3345 POPS FSP DICOFOL

Year: 2010

Project ID	Expected Outputs	Key Activities	Timeframe		Responsible Party	Planned Budget				
			Start	End		Fund	Donor	Budget Descr	Amount US\$	
00061862	3345 POPS FSP DICOFOL	1.capacity build & policy ma			CPR-State Environmental Protec	62000	GEFTrustee	71300	Local Consultants	18,900.00
						62000	GEFTrustee	71600	Travel	1,600.00
						62000	GEFTrustee	72100	Contractual Services-Companie	46,900.00
						62000	GEFTrustee	72400	Communic & Audio Visual Equip	105.00
						62000	GEFTrustee	74100	Professional Services	2,000.00
						62000	GEFTrustee	74500	Miscellaneous Expenses	95.00
						62000	GEFTrustee	71200	International Consultants	38,437.00
						62000	GEFTrustee	71300	Local Consultants	35,565.00
						62000	GEFTrustee	72100	Contractual Services-Companie	1,103,763.00
						62000	GEFTrustee	71200	International Consultants	10,000.00
						62000	GEFTrustee	72100	Contractual Services-Companie	198,470.00
						62000	GEFTrustee	72100	Contractual Services-Companie	81,030.00
						62000	GEFTrustee	71300	Local Consultants	3,700.00
						62000	GEFTrustee	72100	Contractual Services-Companie	66,250.00
						62000	GEFTrustee	74500	Miscellaneous Expenses	750.00
						62000	GEFTrustee	72100	Contractual Services-Companie	125,000.00
						62000	GEFTrustee	71400	Contractual Services - Individ	43,350.00
						62000	GEFTrustee	71600	Travel	16,550.00
						62000	GEFTrustee	72200	Equipment and Furniture	37,375.00
						62000	GEFTrustee	72400	Communic & Audio Visual Equip	6,000.00
TOTAL										1,835,840.00
GRAND TOTAL										1,835,840.00



Annual Work Plan

China - Beijing

Award Id: 00050191

Report Date: 30/1/2008

Award Title: 3345 POPS FSP DICOFOL

Year: 2011

Project ID	Expected Outputs	Key Activities	Timeframe		Responsible Party	Planned Budget				
			Start	End		Fund	Donor	Budget Descr	Amount US\$	
00061862	3345 POPS FSP DICOFOL	1.capacity build & policy ma 2.IPM demonstration progr 3.closure of dicofol product 4.optimiz dicofol production 5.monitor and evaluation pla 6.national replication progr 7.project management			CPR-State Environmental Protec	62000	GEFTrustee	71300	Local Consultants	8,100.00
					CPR-State Environmental Protec	62000	GEFTrustee	71600	Travel	1,600.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	32,600.00
					CPR-State Environmental Protec	62000	GEFTrustee	72400	Communic & Audio Visual Equip	105.00
					CPR-State Environmental Protec	62000	GEFTrustee	74100	Professional Services	2,000.00
					CPR-State Environmental Protec	62000	GEFTrustee	74500	Miscellaneous Expenses	95.00
					CPR-State Environmental Protec	62000	GEFTrustee	71200	International Consultants	30,750.00
					CPR-State Environmental Protec	62000	GEFTrustee	71300	Local Consultants	33,850.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	638,195.00
					CPR-State Environmental Protec	62000	GEFTrustee	71200	International Consultants	5,000.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	43,710.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	43,600.00
					CPR-State Environmental Protec	62000	GEFTrustee	74500	Miscellaneous Expenses	750.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	75,000.00
		CPR-State Environmental Protec	62000	GEFTrustee	71400	Contractual Services - Individ	43,350.00			
		CPR-State Environmental Protec	62000	GEFTrustee	71600	Travel	16,550.00			
		CPR-State Environmental Protec	62000	GEFTrustee	72200	Equipment and Furniture	37,375.00			
		CPR-State Environmental Protec	62000	GEFTrustee	72400	Communic & Audio Visual Equip	6,000.00			
TOTAL						1,018,530.00				1,018,530.00
GRAND TOTAL						1,018,530.00				1,018,530.00



Annual Work Plan

China - Beijing

Award ID: 00050191

Report Date: 30/11/2008

Award Title: 3345 POPS FSP DICOFOFOL

Year: 2012

Project ID	Expected Outputs	Key Activities	Timeframe		Responsible Party	Planned Budget				
			Start	End		Fund	Donor	Budget Descr	Amount US\$	
00061862	3345 POPS FSP DICOFOFOL	1.capacity build & policy ma			CPR-State Environmental Protec	62000	GEFTrustee	71300	Local Consultants	4,050.00
					CPR-State Environmental Protec	62000	GEFTrustee	71600	Travel	800.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	12,550.00
					CPR-State Environmental Protec	62000	GEFTrustee	72400	Communic & Audio Visual Equip	53.00
					CPR-State Environmental Protec	62000	GEFTrustee	74100	Professional Services	1,000.00
					CPR-State Environmental Protec	62000	GEFTrustee	74500	Miscellaneous Expenses	47.00
					CPR-State Environmental Protec	62000	GEFTrustee	71200	International Consultants	15,375.00
					CPR-State Environmental Protec	62000	GEFTrustee	71300	Local Consultants	3,425.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	241,250.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	43,710.00
					CPR-State Environmental Protec	62000	GEFTrustee	71200	International Consultants	17,600.00
					CPR-State Environmental Protec	62000	GEFTrustee	71300	Local Consultants	3,700.00
					CPR-State Environmental Protec	62000	GEFTrustee	72100	Contractual Services-Companie	46,000.00
					CPR-State Environmental Protec	62000	GEFTrustee	74500	Miscellaneous Expenses	750.00
		7.project management			CPR-State Environmental Protec	62000	GEFTrustee	71400	Contractual Services - Individ	21,675.00
					CPR-State Environmental Protec	62000	GEFTrustee	71600	Travel	8,274.00
					CPR-State Environmental Protec	62000	GEFTrustee	72200	Equipment and Furniture	18,688.00
					CPR-State Environmental Protec	62000	GEFTrustee	72400	Communic & Audio Visual Equip	3,000.00
TOTAL										441,947.00
GRAND TOTAL										441,947.00