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UNIDO Contract No: 05/019
UNIDO Project No: EG/CPR/99/G31
P.O. No: 16000815

Final Report

Submitted to

United Nations Industrial Development Organization (UNIDO)

Contract Name:

Installation of Waste Heat Power Plant Equipment for Shanxi Gaoping Xinggao Coking Co., Ltd.

Project Name:

Energy Conservation and Greenhouse Gas Emissions Reduction in Chinese TVEs (Phase II)

SUBMITTED BY

The Third Chemical Engineering Construction Company of China

August 16, 2006

Contents

1.0 General Introduction

In accordance with the task 1 & task 2 stipulated expressly in the contract of installation of Waste Heat Power Plant Equipment for Shanxi Gaoping Xinggao Coking Co., Ltd. signed between UNIDO and TCC, namely as Project Task 1:Devise general installation drawings according to the engineering design of the power plant and Project task 2: In consultation with the group, propose detailed technical requirements and processes for the installation works, and conduct the installation upon approval by the group of the proposed installation process and detailed technical requirement, TCC hereby submits its Final Report in compliance with the aforesaid two tasks to UNIDO for approval.

Based on the contract requirements, we hereby summarize all the activities and works which have been performed and finished by the Contractor - TCC from July 8, 2005 to Sep.15. The main accomplishments are as follows:

a. Devise Engineering Designing

b. Organize and Mobilize Construction Staffing and Construction Equipment, etc

c. Organize and Conduct Site Construction Work

d. Project Acceptance and Operation

2. Summary of Project Progress

2.1 Preparation of Construction Execution Plan

Project specialist team will prepare construction execution plan based on construction drawings, site conditions, applicable national design and construction standards/specification, construction duration requirements and quality standards (For details, see attached schedule 1: Main Acceptance Codes for Design and Construction Work). The construction execution plan includes the following contents mainly:

A) Project Brief Introduction

B) Preparation Basis

C) Main Construction Managerial and Supervisory Personnel

D) Construction Preparation

E) Overall Construction Sequences

F) Main Construction Methods

G) Construction Procedures

H) Main construction technology, safety specification and regulation applied to the project

I) Quality Plan and Quality Assurance Measures

J) Preventive Measures of General Quality Problems

K) Occupational Safety, Health and Environment Measures

L) Construction Equipment and Tools and Material Plan

M) Construction Schedule

N) Labor Mobilization Schedule

O) Construction Plot Plan

Attached Schedule 1: Main Acceptance Codes for Design and Construction Work

No.	Description	Standard No.
1	Design Specification for Industry Piping Works	SH/T3042-02

No.	Description	Standard No.
2	Design Specification for Industrial Water Supply & Drainage Works	SH/T3137-02
3	Design Specification for Architectural Heating and Ventilation Works	SH/T4046-02
4	Design Specification for Industrial Electrical Automation	SH/T3552-02
5	Design Specification for Industrial Equipment	SH/T3250-02
6	Construction and Acceptance Specification for Welding of Site Equipment and Process Piping	GB50236-98
7	Construction and Acceptance Specification for Industrial Metal Piping Works	GB50235-97
8	Construction and Acceptance Specification for Heating and Sanitary Works	GBJ242-82
9	Construction and Acceptance Specification for Ventilation and Air Conditioner	GB50243-97
10	Construction and Acceptance Specification for Architectural Anti-corrosion Works	GB50212-91
11	Construction and Acceptance Specification for Rotary Motor of Installation Work of Electrical Devices	GB50170-92
12	Construction and Acceptance Specification for Instrument Works of Industry Automation	GBJ93-86
13	Construction and Acceptance Specification for Water Supply and Drainage Piping Works	GB50268-97

The meeting of review and checkup of construction execution plan was called on by Gaoping Xinggao Coking Corp. Ltd, meanwhile, the relative meeting minutes was prepared. (See Attachment B).

For detailed Construction Work Schedule, see Attachment A.

2.2 Organization of Mobilization of Construction Personnel and Equipment

During the period from July 15, 2005 to July 21, 2005, construction personnel, equipment and tools, materials and consumables were organized by TCC and be mobilized into site in compliance with the construction execution plan and construction execution plan, meanwhile, site temporary facilities will be arranged and set up according to the construction plot plan of the construction execution plan

Attachment : Main Construction Personnel engaged in this Project

No.	Description	Q'ty	Remarks
1	Arc Welder	15	All construction personnel engaged into the Works must hold effective certificates.
2	Pipe Fitter	8	
3	Steel Worker	6	
4	Millwright	4	
5	Gas Welder	5	
6	Anti-corrosion Worker	15	
7	Plumber	12	
8	Rigger	6	
9	Scaffolding Worker	6	
10	Oil Painter	6	
11	Electrician	6	
12	Helper	15	

Attachment: Main Construction Equipment and Tools mobilized for the Project

No.	Description	Type/Size	Unit	Q'ty	Remarks
1	Mobile Crane	QY-20	Set	1	All construction equipment and tools must be guaranteed within effective service life.
2	Mobile Crane	QY-50	Set	2	
3	Chain Block	10t	Ea.	10	
4	Chain Block	5t	Ea.	4	
5	Welding Machine	25KW	Set	15	

No.	Description	Type/Size	Unit	Q'ty	Remarks
6	Angular Grinder	φ150	Ea.	10	
7	Angular Grinder	φ100	Ea.	7	
7	Gas Welding Tool		Set	6	
8	Electrode Oven	0-3000C	Set	2	
9	Automatic Cutting Machine	φ400	Set	3	
10	Bench Drill	Z416	Set	1	
11	Thrust Borer		Set	2	

2.3 Organization of Site Construction Work

During the period from July 22, 2005 to Sep. 5, 2005, the project specialist team organized the construction personnel to complete all construction tasks of process piping complete with power plant, and painting, insulation, water supply and heating system in compliance with the construction drawings, construction execution plan, applicable national design and construction standards/specification and the main material supplied by Owner.

The detailed construction sequences are as below:

a) Quality inspection of raw materials. The unqualified material is prohibited to be used into this project.
b) Welding and installation of process piping, water supply and heating system.
c) NDT of process piping
d) Hydraulic test and flushing of process piping, water supply and heating system
e) Painting and insulation of process piping

2.4 Construction Completion and Acceptance

Relying on the nine-weeks elaborate construction works organized by the project specialist team, TCC has completed all equipment installation, process piping, the whole plant's water supply and drainage piping, HVAC works, instrument installation & calibration works and painting & insulation works of piping works of Waste Heat Power Plant Equipment for Shanxi Gaoping Xinggao Coking Co., Ltd. stipulated in TOR (Terms of Reference) on Sep. 12, 2005 successfully. After one - week test running (from Sep.13 to

Sep.18), the whole generator sets were operated in a good and stable condition, the generating energy has reached to the designed capacity. The final joint inspection & acceptance work has been carried out on Sep.19, 2005 by Shanxi Gaoping Xinggao Coking Co., Ltd together with Shanxi Huanqiu Construction Supervision Company and TCC. For Minutes of Acceptance Meeting and Project Completion Acceptance Certificate, see attachment C and D please.

Acceptance sequences are as below:

a) Specialist Acceptance Teams are organized by different category, namely as equipment acceptance team, processing work acceptance team, electric and instrument work acceptance team.
b) Inspection and Acceptance of Construction Quality performed by each Specialist Acceptance Team
c) Inspection and Acceptance of Completion Documents and Information performed by each Specialist Acceptance Team
d) Summary

Attachment A: Construction Work Schedule

No.	Task / Activities		Participants	Products	Date (2005) 6.17 - 6.23	6.24 - 6.30	7.1 - 7.7	7.8 - 7.14	7.15 - 7.21	7.22 - 7.28	7.29 - 8.4	8.5 - 8.11	8.12 - 8.18	8.19 - 8.25	8.26 - 9.1	9.2 - 9.8	9.9 - 9. 15
1	Task 1	Activity 1: Project Commencement Statement & Inception Meeting	Jiang Huayong Gao Wenjing	Work Commence Report (6.18)	—												
		Activity 2: Prepare Construction Drawing for Installation Work	Jiang Huayong, Gao Wenjing, Chen Jijin, Tao Hu, Wu Weiguo, Liu Jia, Xie Fasheng, Xie Tao	Construction drawings	—	—	—										
2	Task 2	Activity 1: Prepare Project Execution Plan	Jiang Huayong, Gao Wenjing, Li Jiangong, Chen Fuan, Chen Jijin, Tao Hu, Wu Weiguo, Liu Jia, Xie Fasheng, Xie Tao, Bai Xin, Yue Qinghuai, Zhao Dawu, Wang Yong	Construction execution plan			—										
		Activity 2: Manpower and Const. Equipment Mobilization, Temp. Facilities Set-up	Jiang Huayong, Gao Wenjing, Li Jiangong, Chen Fuan, Bai Xin, Yue Qinghuai, Zhao Dawu, Wang Yong	Ready for construction				—									

		Activity 3: Field Construction Execution	Jiang Huayong, Gao Wenjing, Li Jiangong, Chen Fuan, Chen Jijin, Tao Hu, Wu Weiguo, Liu Jia, Xie Fasheng, Xie Tao, Bai Xin, Yue Qinghuai, Zhao Dawu, Wang Yong	Product formation														
		Activity 4: Acceptance	Jiang Huayong, Gao Wenjing, Li Jiangong, Chen Fuan, Chen Jijin, Tao Hu, Wu Weiguo, Liu Jia, Xie Fasheng, Xie Tao	Operation of product														
3	Completion of Task	Project Completion & Start-up, Summarizing and Preparing Final Report	Jiang Huayong Gao Wenjing,	Evaluation and conclusion														
		Final Report																

Attachment B: Minutes for Review and Checkup Meeting of Construction Execution Plan

Meeting Minutes

Location: Office of Shanxi Gaoping Xinggao Coking Co., Ltd

Date: July 15, 2005

Attendant:

TCC: Mr. Jiang Huayong (Project Manager), Mr. Gao Wenjing (Chief Engineer), Mr. Tao Hu (Engineer, Registered Electric Engineer), Mr. Wu Weiguo (Senior Engineer, Registered Instrument Engineer), Ms. Liu Jia (Engineer, Registered Painting Engineer), Mr. Chen Jijin (Senior Engineer, Registered Chemical Technology Engineer), Mr. Xie Fasheng (Senior Engineer, Registered Plumbing Engineer), Mr. Xie Tao (Registered HVAC Engineer).

Gaoping Xinggao Coking Co., Ltd.:

Mr. Hou Kang (person in charge for this project)

Shanxi Huanqiu Engineering Construction Supervision Company:

Mr. Wang Ping (Project Superintendent);

Mr. Guan Qiang (Chemical Technology Engineer)

Subject: Review and Checkup of Construction Execution Plan

1) Mr. Jiang Huayong, TCC's Project Manager, introduced the overall design thought and key points of the construction execution plan in details by Power Points.

2) Mr. Gao Wenjing (the chief engineer of TCC) and each discipline's engineers of TCC made the detailed clarification for the questions raised by Gaoping Xinggao Coking Co., Ltd and Shanxi Huanqiu Engineering Construction Supervision Company .

3) After discussion, all participants came to an common understanding with the following opinions on the review matters of construction execution plan:

- The construction execution plan prepared by TCC is suitable and feasible for site construction works with clear train of thought and applicable construction procedures;
- TCC must organize the site construction work and ensure good construction quality and due construction schedule strictly in compliance with the approved construction execution plan.

Attachment C: Minutes for Construction Completion and Acceptance

Meeting Minutes

Location: Office of Shanxi Gaoping Xinggao Coking Co., Ltd

Date: Sep. 19, 2005

Attendant:

TCC: Mr. Jiang Huayong (Project Manager), Mr. Gao Wenjing (Chief Engineer), Mr. Tao Hu (Engineer, Registered Electric Engineer), Mr. Wu Weiguo (Senior Engineer, Registered Instrument Engineer), Ms. Liu Jia (Engineer, Registered Painting Engineer), Mr. Chen Jijin (Senior Engineer, Registered Chemical Technology Engineer), Mr. Xie Fasheng (Senior Engineer, Registered Plumbing Engineer), Mr. Xie Tao (Registered HVAC Engineer).

Gaoping Xinggao Coking Co., Ltd.:

Mr. Hou Kang (person in charge for this project)

Shanxi Huanqiu Engineering Construction Supervision Company:

Mr. Wang Ping (Project Superintendent);

Mr. Guan Qiang (Chemical Technology Engineer)

Mr. Dong Fang (Equipment Engineer)

Subject: Construction Completion and Acceptance

1) Mr. Jiang Huayong, TCC's Project Manager, introduced the overall construction organization and management conditions throughout the whole construction works of Waste Heat Power Plant in details;

2) Mr. Gao Wenjing, TCC's chief engineer, elaborate the construction quality control and management during the construction;

3) Finally, Mr. Wang Ping, Project Superintendent of Shanxi Huanqiu Construction Supervision Company, make the speeches on the construction execution of this project and his key viewpoints as followings:

- TCC's Top Management Team has pay more attention to the whole construction works, and the construction procedure and quality are controlled in good status with rather strong construction organization;
- After review and check the construction works and completion documents provided by TCC, all participants agreed that the construction quality of the works performed by TCC is qualified and the completion documents are complete.

Attachment D: Construction Completion Acceptance Certificate

Construction Completion Acceptance Certificate

Project Name:	Waste Heat Power Plant of Xinggao Coking Co., Ltd	Building Area (m2)	5000	Storey	4	Project Location	Macun Town, Gaoping City, Shanxi Province
Structure Type	Reinforced Concrete, Brick and Concrete Construction	Project Cost		$ 10000		Start/Finish Time	2005.6.16/2005.9.12

Project Description and Inspection Status

1) The project has been finished completely in compliance with the requirements stipulated in construction contract and designed drawings and can meet the production requirements.
2) The construction quality is qualified without any deviation which may influence the usage function.
3) The technical documents and data are complete and be bound into files and the as-built drawings are complete.

The aforesaid statements are true and the acceptance work is qualified.

Comments on Acceptance Work	Owner	Construction Supervision Company	Design Company	Construction Contractor
	(signature)	(signature)	(signature)	(signature)

Attachment E : Significance of Project put into Operation

The Phase I Waste Heat Power Plant project of Xinggao Coking Co. Ltd, that is condensing turbine generator sets equipped with the 8x20t/h Waste heat boiler and auxiliary devices, have been installed completely and be committed to running successfully on Sep. 12, 2005 under the joint efforts of Xinggao Coking Co., Ltd and TCC with the vigorously supports of United Nations Industrial Development Organization (UNIDO) and Beijing Project Office; the generating energy has reach to 120,000,000 KWh/y. In order to make " anthracite " coking industry more stronger and powerful, Xinggao Coking Co., Ltd. has prepare the long-term plan, that is Develop Coking Industrial and Electricity Industrial Simultaneously, Look Upon Environment Protection and Economy Efficiency Equally. It is our great honors to build the Waste Heat Power Plant with the supports of UNIDO for Xinggao Coking Co., Ltd. This project is a typical exemplification of multipurpose usage of the resource by means of using the waste heat of coking. Without the building-up of the waste heat power plant, RMB of 25 million yuan will be lost without any value along the chimney every year, it will be the waste of the energy to the society and will be the economic losses to enterprises.

After the Waste Heat Power Plant of Xinggao Coking Co., Ltd has been built up, the discharged high-temperature coking tail gas can be converted into 100 million degrees of electric energy, the production value of 25 million Yuan can be created for enterprise, meanwhile, the labor force about 75 persons will obtain employment, furthermore, 15 million Yuan profits and taxes can be created for enterprise and the society every year. Comparing with the thermal power plant with the similar size, the project of Xinggao Waste Heat Power Plant can reduce the burning of 70,000 tons normal coal every year (equal to electric coal 100,000 tons) and can reduce the emission of CO2 of 256,000 tons every year. In addition, it can also reduce the discharge of 30,000 tons of furnace ashes every year. Although the power technology level of the Waste Heat Power Plan is at the leading position comparing with the similar domestic technology, the technology of recovery of waste heat still need to be developed comparing with some overseas company's advanced technology.

After the establishing of Xinggao waste heat power plant, Xinggao Coking Co., Ltd can be provided with sufficient heating sources in winter, some staffs' living facilities such as bathing

services with hot water, cooking services in restaurant and drinking hot water boiler, etc which use the coal in past now has been changed into the usage of the steam of Power Plant. Accordingly, it will reduce the burning of 260 tons normal coal every year (equal to electric coal 364 tons),and can reduce the discharge of 953.3 t CO2 every year. Additionally, it can also reduce the discharge of 110 tons of furnace ashes every year.

In May 2005, the residue heat power plant project at Xinggao Coking Co., Ltd was highly praised by the intermediate evaluation expert group of the United Nations (GEF) [led by: Mr. Frank pool and Dr. Wen Gang]

Currently, the established Xinggao Waste Heat Power Plant is operating in a clean, low pollutant and full load condition. It set an example for establishing the industrial economy benefit chain in township enterprises, has the good advantage for improving the development of the economy of Chinese TVEs and increasing its portion in the national industry; and offer the best evidence for setting up the technical specification of environmental protection in coking enterprises by government.

By means of adopting the clean and environmental protection coking technology and establishing the Waste Heat Power Plant of Xinggao Coking Co., Ltd, does not only get a good social benefit but also made the direct economic benefits. This economic benefits mainly refer to: the economic benefits produced by economizing water, the economic benefits taking by utilizing the waste heat, and the economic benefits produced by adopting the non-recoverable process and reducing the let of contamination accordingly etc. Future society is a society that pursues the environmental protection, so it has a prodigious potential in using the waste heat to generate electricity in clean-type coking furnace. (for specific data, the explanations have been given for each matter respectively).The achievements what Xinggao Coking Co., Ltd. has obtained on the aspects of cleanness & environmental protection and high efficiency and energy conservation has wined the approval from domestic authorities, has already been honored with the title of Sample Enterprise in Coking and Environmental Protection Sector by

United Nations Environment Protection Organization .

Up to now, after visiting Xinggao Coking Co., Ltd, there are more than 40 domestic coking company decide to imitate the production model of Xinggao Coking Co., Ltd.. 13 enterprises came from the domestic eight provinces have dispatched 14 groups of students to Xinggao Coking Co., Ltd to obtain training. Meanwhile, 10 Indian enterprises have visited Xinggao Coking Co., Ltd and have already started to imitate the production mode of Xinggao Coking Co., Ltd. Among them, three enterprises have dispatched the students to learn in Xinggao Coking Co. Ltd. (For detailed training, see the following table please)

Training Schedule organized by Xinggao Coking Co., Ltd.

Times	Training Time	Trained Company	Persons	Days
1	2004.5	Shandong Shunxin Coking Corporation	50	60
2	2004.5~7	Shanxi Jiexiuluxin Coal Gasification Corporation	18	60
3	2004.7~9	Shanxi Jiexiuluxin coal and gasify Corporation	23	60
4	2004.8~9	Hunan Loudi Xingxing Coking Corporation	30	30
5	2004.9~11	Gaoping City Sanjia Coking Plant Corporation	40	60
6	2004.8~10	Liaoning Shengmeng Coking Corporation	20	60
7	2004.9~11	Shanxi Qinxin Coal Coking Co., Ltd.	27	60
8	2004.11	Qingyuan Xian Mingyuan Coal Coking Co., Ltd	15	30
9	2004.11	Shandong Rizhao Coking Co., Ltd	15	15
10	2004.11	Neimenggu Zhongxing Coal Co., Ltd.	10	60
11	2005.3	Hebei Wu`an Tongbao Group Co., Ltd.	10	30
12	2005.3	Gaoping Sanjia Coking Co., Ltd.	40	60
13	2005.5	Taiyuan Xishan Risheng Coal Coking Co., Ltd	35	30

Times	Training Time	Trained Company	Persons	Days
14	2005.7	Zhejiang Quzhou Yuanli Metalwork Co., Ltd	15	30
15	2005.9	India NECO Steel & Iron Co., Ltd.	8	30
16	2005.11	India JINDAL Steel And Electric Power Co., Ltd	7	30
17	2005.11	India NECO Steel & Iron Co., Ltd.	6	30

This project has accumulated rich experiences on replicating the successful experiences and best practices of the pilot coking plants for non-pilot enterprises by implementing technology upgrading to improve energy efficiency and product quality, meanwhile, it has made important and active contributions to reduce the emissions of the greenhouse gas in Chinese TVEs finally and lessen the danger of the global temperature changes. The people of the world will benefit from the reduction of the greenhouse gas and China will also benefit from the reduction of pollution.