CHAPTER 1 GENERAL

THE DETAILED DESIGN STUDY FOR

MODERNIZATION OF TASHKENT THERMAL POWER PLANT

IN THE REPUBLIC OF UZBEKISTAN

FINAL REPORT

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CHAPTER 1 GENERAL

1.1 Background of the Study

1.1.1 General Background

The Republic of Uzbekistan (hereinafter called as Uzbekistan) is a land-locked country, which is located in the center of the Central Asia region of the former Soviet Union as shown in Figure 1.1-1, and shares borders with the Republic of Kazakhstan to the north, Turkmenistan to the west, the Republic of Kyrgyz to the east, and the Republic of Tajikistan and Afghanistan to the south. With 24 million people, it is most populous in the five Central Asian nations. The Kyzylkum Desert covers a large portion of the territory, and the country has a continental climate with a vast discrepancy between the maximum and the minimum temperatures.

Uzbekistan gained independence in August 1991, amidst the dismantling of the Soviet Union in the latter half of the 1980's, and is a republic with a president as its head of state. In addition to the traditional key industry of cotton growing, industries related to machinery and chemical fertilizers have been developed, and the country is also rich in non-ferrous metal resources, such as gold. There is an abundant of energy resources, such as petroleum, natural gas and coal. The gas production of Uzbekistan is 2.0 x 10^{15} BTU/year, which is second to Russia (20.8 x 10^{15} BTU/year) among the countries of the former Soviet Union. Striving for economic independence after the political independence from the former Soviet Union, objectives were set to gain energy and food self-sufficiency, with steady growth in the production of petroleum, gas and grain crops. Uzbekistan is going gradually but steadily on definite open market and liberalization of economy.

Figure 1.1-1 Location of the Republic of Uzbekistan

1.1.2 Situation of Power Sector

Power sector in Uzbekistan is entirely under the control of SJSC "Uzbekenego" holds the whole power transmission and distribution facilities and its power generation capacity is approx. 11,000 MW, which accounts for approx. 97 % of the total power generation capacity in the country. Remaining power generation capacity of less than 3 % (approx. 300 MW) is owned by industry. Most of power plants use natural gas and oil fuels except for Angren and Novo-Angren Power Plant (four of seven units), which use domestic coal.

All power generation facilities in Uzbekistan are conventional type (boiler-steam turbine), which were constructed in the era of the former Soviet Union, and most of power plants are old and deteriorated with low thermal efficiency and low reliability. It results in increasing of energy use and emission of air pollutants and results in unfavorable situation from the environmental protection point of view.

1.1.3 Background of the study

Tashkent TPP consists of twelve units of conventional type power plants and be an important power plant taking care of the metropolitan area. However, the plants have been in services for 30 ~ 40 years with considerable deteriorations here and there and their operating reliability and generation efficiency are lowered with resultant increase of air pollutant matters and greenhouse gases. In consideration of such situations, the Government of Uzbekistan made a modernization plan to install 370 MW class natural gas fired combined cycle plant (hereinafter called as "the Plant") with state-of-the art technology and higher thermal efficiency and requested the Government of Japan to study a feasibility of the modernization plan.

In reply to the above request of the Government of Uzbekistan, JETRO (Japan External Trade Organization) carried out the feasibility study to review the viability of the modernization plan in his "International Atmospheric and Environmental Research Development Program 1998". The plan was verified feasible through this study, and the cabinet of the Government of Uzbekistan decided to implement it.

Thus the Government of Uzbekistan filed the applications to the Government of Japan; i.e. the application of yen-credit for construction of the Plant by JBIC (Japan Bank for International Cooperation) loan in December 1999 and the technical assistance granted by JICA for the Detailed Design Study of the Plant in July 2001.

In response to the above applications, JICA dispatched the Project Formulation Study Team to Uzbekistan in February 2002. Through the review results of the Team the Government of Japan decided to conduct the Study for Modernization of Tashkent TPP based on the request applied by the Government of Uzbekistan. The scope of work regarding the Study was determined through the discussion between the Uzbekistan side and the Preliminary Study Team of JICA, which was dispatched to Uzbekistan in June 2002.

The Exchange of Note (E/N) of the Study was concluded between both Governments and the Loan Agreement of yen-credit between JBIC and Uzbekistan Government in May 2002.

1.1.4 Objectives of the Study

The objectives of the Study are the followings:

(1) To prepare the tender documents for EPC*[1] contract of the Plant to be installed in Tashkent TPP under JBIC loan. The preparation will be accompanied by the detailed site survey, the detailed engineering and the detailed Environment Impact Assessment Report to be provided by Uzbekistan side. The Plant will be contracted through ICB*[2] and constructed as Full Turnkey base by a single EPC contractor with a single responsibility.

(2) To recommend an improvement plan of the existing Tashkent TPP with regard to operation, maintenance, financial matters, organization, environment, etc.

In addition, a technology transfer to the staff concerned of Uzbekistan will be carried out by the JICA Study Team in the course of the Study and at Technology Transfer Seminar.

Note *1: Engineering, Procurement and Construction
*2: International Competitive Bidding

1.1.5 Areas to be Studied

The areas to be studied are the plant site of Tashkent TPP and its surrounding areas. (Refer to Figure 1.1-2 Map of Tashkent City and Location of DC "TASHTPP")

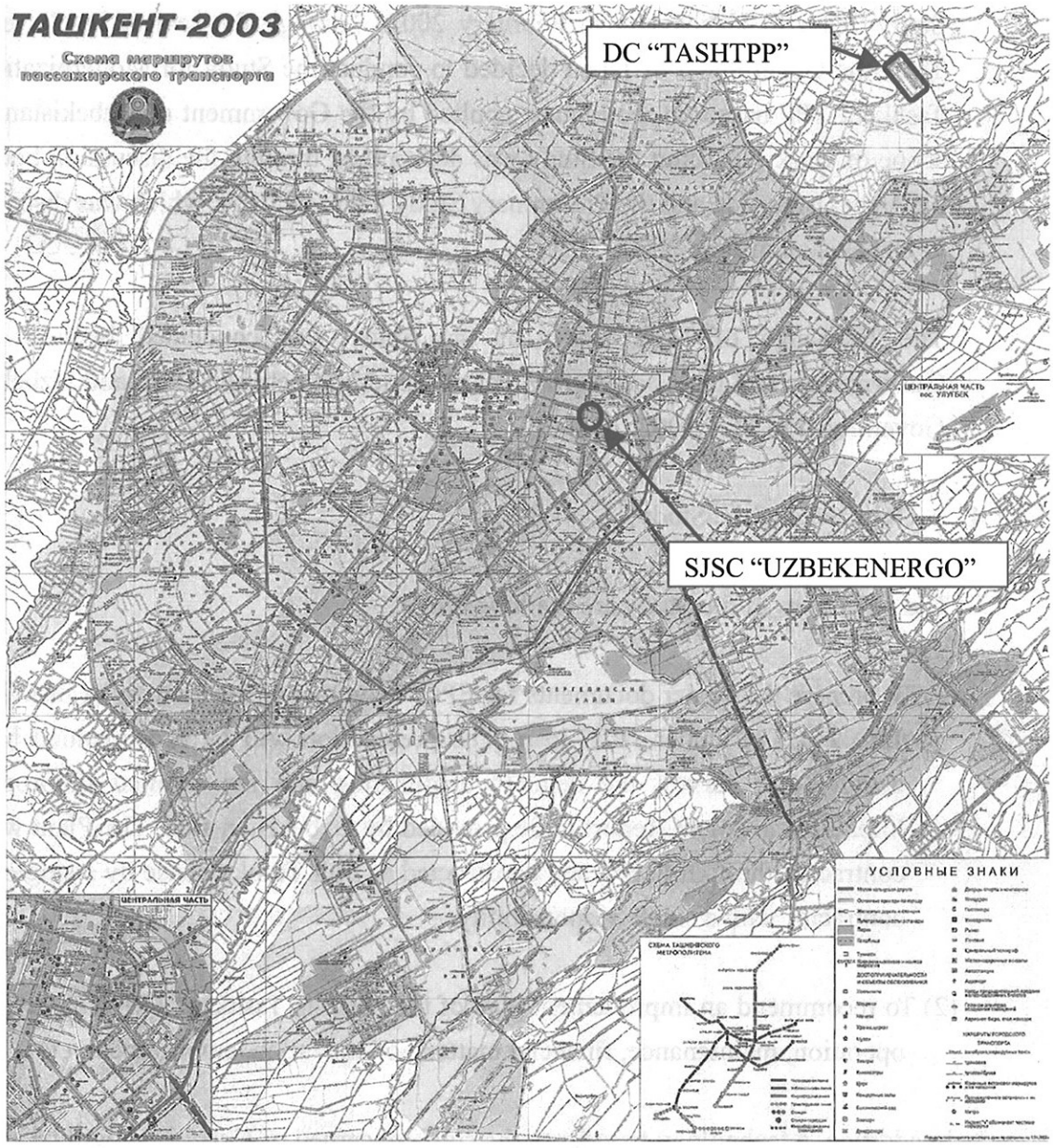

Figure 1.1-2 Map of Tashkent City and Location of DC "TASHTPP"

1.1.6 Scope of the Study

Based on the Minute of Meeting and Scope of Works which were signed on July 13, 2002 between the Preliminary Study Team of JICA and SJSC "Uzbekenergo", the following components of the Study will be carried out:

(1) Formulation of joint study team

(2) Review and reassess of the application letter submitted by Uzbekistan, the previous review and study results of the JBIC's Appraisal Mission for the Project, the information and data collected by the previous study teams of JICA and other related information and data

(3) Examination of the present structure and operating, maintenance, financial and environmental conditions of the existing DC "TASHTPP"

(4) Examination of the conditions of the new power plant site, including geological survey, access and transportation to the site, temporarily storage yard for the materials for election, etc.
SJSC "Uzbekenergo" will, at his expense, examine an existence of obstacles under the ground of the site, and remove them, if any, in due course for construction of the Plant.

(5) Establishment of the design conditions for the Plant, such as atmospheric conditions, fuel conditions, required performance for operation and maintenance, environmental protection measures, etc.

(6) Establishment of optimum plant configurations, including shaft arrangement of gas and steam turbines, bottoming cycle system, configuration of switchyard, Distributed Control and Monitoring system (DCMS), etc.

(7) Study about a optimum erection method and construction schedule considering maximum size and weight limitations of transferred materials/equipment to be varied depending upon transportation routes

(8) Estimation of the cost of the Plant with referring to the loan amount from JBIC

(9) Study about the operation pattern of new power plant in relation with the existing plants

(10) Estimation of annual power generation and revenue by the Plant considering the power generation sharing between the existing power plants and the Plant.

(11) Estimation of operation, maintenance, personnel and other miscellaneous costs of the Plant.

(12) Economic and financial analyses, including calculation of FIRR*[3] and EIRR*[4], and sensitivity analysis of the Plant.

(13) Estimation of balance sheet, state of income and cash flow for a long term

operation including construction period for the whole DC "TASHTPP" as well as for the Plant itself

(14) Preparation of pre-qualification documents and tender documents in conformity with "Guidelines for Procurement under JBIC ODA Loan". The tender documents consist of instruction to tenderer, general conditions of contract, project requirements, technical specification including conceptual drawings of layout, flow diagram, etc.

(15) Reviewing and analyzing the previous preliminary EIA, and supporting the Uzbekistan side to prepare the detailed EIA report in line with the JBIC's guidelines

(16) Coordination between Uzbekistan side and JBIC and assistance necessary for the preparation of tender documents

(17) Recommendation of improvement plan for operation, maintenance, financial matters, organization, environment, etc. of the whole DC "TASHTPP"

(18) Technology transfer to the staff concerned of Uzbekistan in the course of the Study and at Technology Transfer Seminar. The matters presented in the Seminar will include introduction of the latest power engineering technology, international tendering process, management technique of power plant, etc.

(19) Training in Japan for about two (2) weeks of one (1) person of SJSC "Uzbekenergo" during each fiscal year of 2002 and about three (3) weeks of four (4) persons of SJSC "Uzbekenergo" during each fiscal year 2003.

(20) Estimation of reduction effect of greenhouse-effect gasses due to introduction of the Project

(21) Preparation of PDD (Project Design Document) of CDM (Clean Development Mechanism)

(22) Conducting power system analysis

Note *3: Financial Internal Rate of Return
*4: Economic Internal Rate of Return

In addition, Figures 1.1-3 and 1.1-4 show General Arrangement of present and after modernization of DC "TASHTPP"

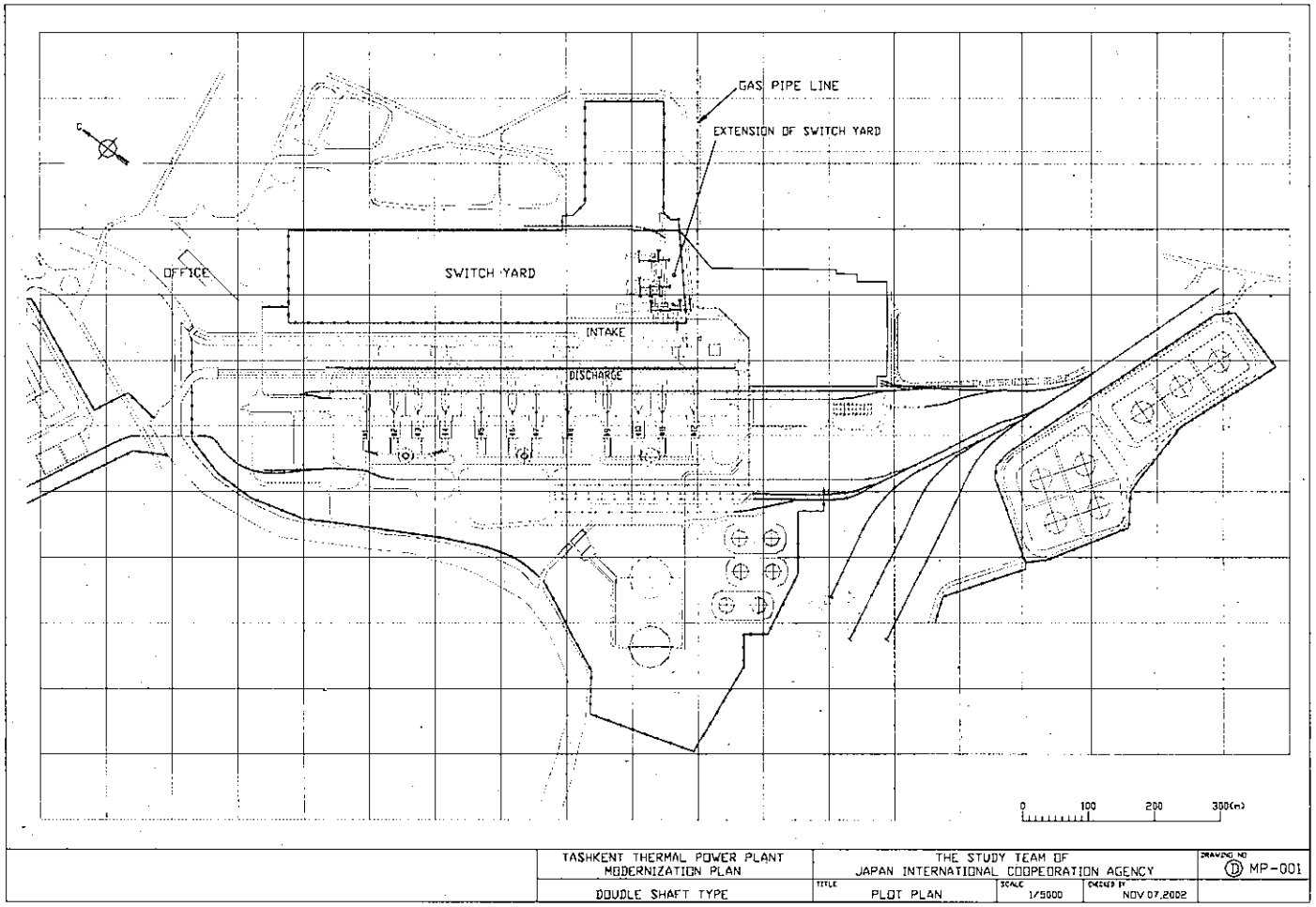

Figure 1.1-3 General Arrangement of DC "TASHTPP" (At Present)

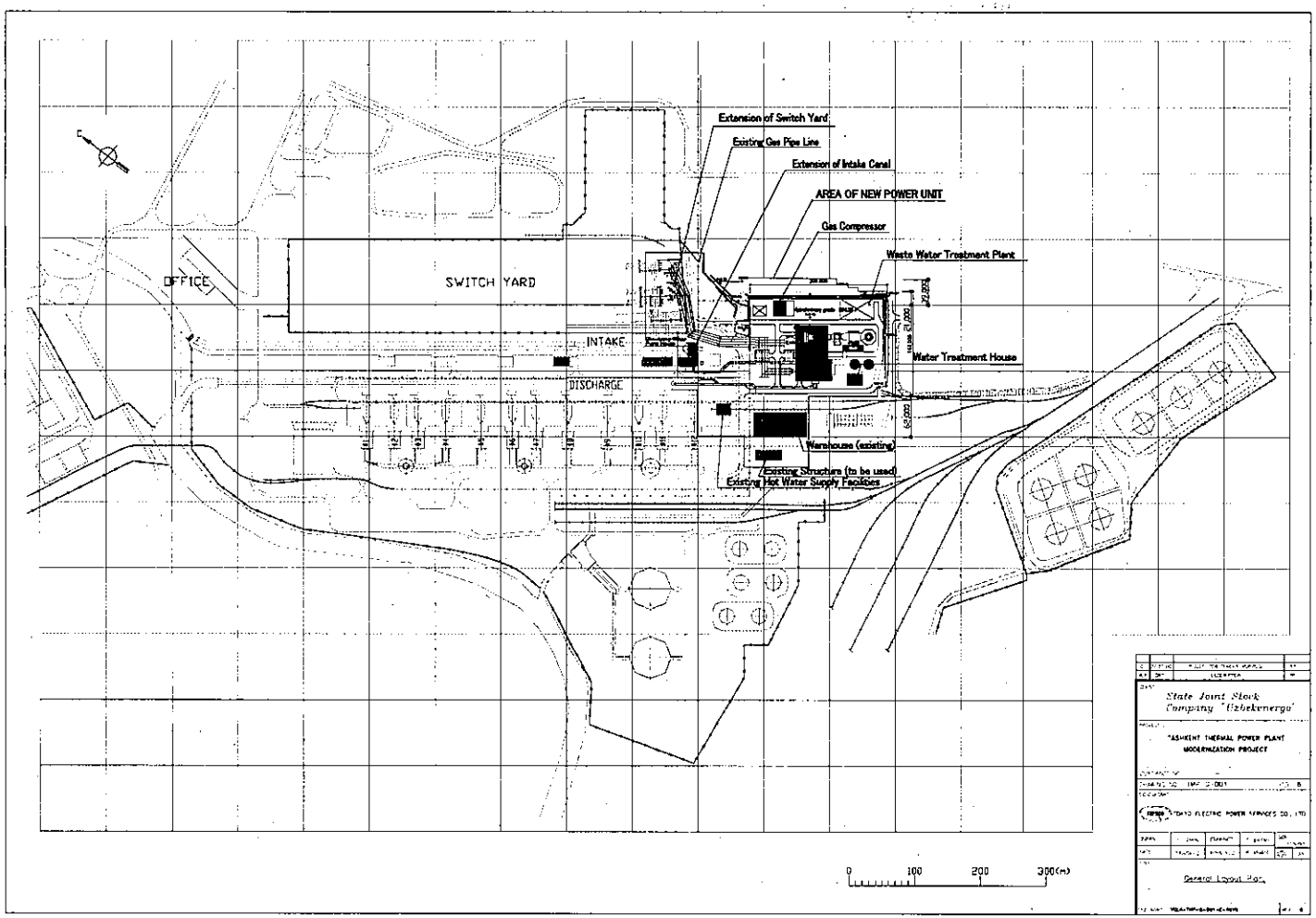

Figure 1.1-4 General Arrangement of DC "TASHTPP" (After Modernization)