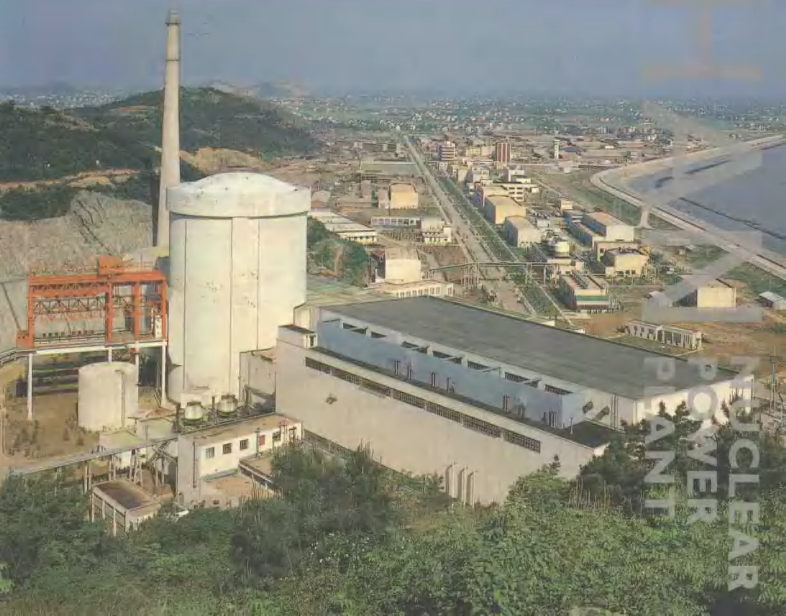
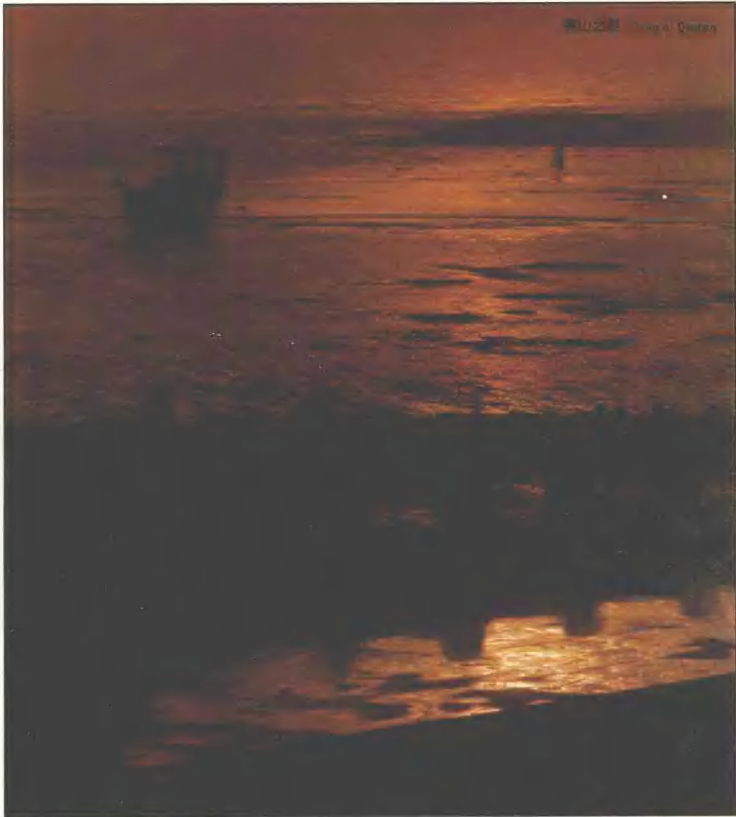


杭州灣畔一明珠

# 秦山核電站



QINSHAN  
NUCLEAR  
POWER  
PLANT



杭州湾畔一明珠——萧山核电站(画册)

A PEARL AT THE HANGZHOU BAY—THE QINSHAN NUCLEAR POWER PLANT (Picture Album)

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杭州湾畔-明珠  
秦山核电站

A PEARL AT THE HANGZHOU BAY

**QINSHAN NUCLEAR  
POWER PLANT**

中国核工业总公司 编  
秦山核电公司

Prepared by  
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# 前 言

秦山核电站是我国自行设计建造的第一座核电站，采用压水型反应堆，一期工程装机容量为30万千瓦。1985年3月主体工程开工，1991年12月15日并网发电。它的建成是我国核工业发展史上的一个新的里程碑，标志着从此结束了我国大陆无核电的历史。

秦山核电站是在党中央、国务院的领导和关怀下，中央有关部委和浙江、上海等省市大力支持下，由中国核工业总公司秦山核电公司负责建设起来的。在建设主要依靠我国自己的科技力量和工业基础，同时重视吸收国际经验，开展国际合作。它的建设成功是我国和平利用原子能、将高科技转化为生产力的一个范例，是自力更生方针与对外开放政策相结合的一曲凯歌。

秦山核电站建设过程中始终贯彻执行了“质量第一、安全第一”的方针，从科研设计、材料选用、设备制造、建筑安装到调试运行，均建立了严格的质量和安全的监督和保证体系；电站的设计和建造是按照国际安全标准要求进行的。国际原子能机构的评审结论是：“整个电厂的建设是高标准的，是在国际上认为满意的水平上进行的”，“秦山电厂将是一个安全的、高质量的核电站”。

本画册全面、系统、形象地介绍了秦山核电站建设的历程和成就，展现了秦山建设者拼搏奉献的精神风貌。

## PREFACE

The Qinshan Nuclear Power Plant is the first nuclear power plant designed and constructed domestically in China, which adopts PWR type reactor with an installed capacity of 300 MWe for the Qinshan First-Phase Project. The principal part of the project was initiated in March 1985, and the plant was connected to the grid for electricity generation on December 15, 1991. Its successful construction marks a new milestone for China's nuclear industry development, and implies the end of the history of no nuclear power on the mainland of China.

The Qinshan Nuclear Power Plant was built up under the responsibility of the Qinshan Nuclear Power Company, a subsidiary of the China National Nuclear Corporation (CNNC), and with direction and loving care of the Party Central Committee and the State Council and energetic supports of the ministries and commissions concerned, the provinces and municipalities such as Zhejiang and Shanghai. In the course of construction, our own technical and industrial capability was mainly relied upon while great importance was attached to absorbing international experience and promoting international cooperation. It is regarded as a good example of peaceful application of nuclear energy and transformation of high technology into productive forces, and a factual combination of self-reliance principle with opening policy.

The principle of "quality first and safety first" was consistently adhered to throughout construction of the Qinshan Nuclear Power Plant. Strict supervision and assurance systems on quality and safety were established for scientific research and design, material selection, equipment manufacture, construction and installation, and commissioning and operation; the design and construction of the plant were carried out in accordance with the requirements of internationally recognized safety standards. The review of the International Atomic Energy Agency (IAEA) concluded, the construction of the plant was of high quality as a whole and has been carried out at a satisfactory level universally acknowledged, and the Qinshan Nuclear Power Plant will be a safe and high-quality nuclear power plant.

This picture album introduces the construction course and achievements of the Qinshan Nuclear Power Plant in a comprehensive, systematic and vivid way, and presents the spiritual outlook of the builders in devotion.

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预祝我国自行  
设计自己制造的第  
一座核电站早日  
建成

江泽民  
一九八六年五月二日

江泽民题词

Inscription by JIANG Zemin

再接再劬建成  
核电为国争光

李鹏

一九九〇年  
四月十四日

发 展 核 电  
选 福 人 民

邹家华题词

Inscription by ZOU Jiahua

邹家华  
一九九二年十二月廿日

秦山核电站  
我国核能和  
平利用的开拓  
先锋要多方  
保证它安全  
运行这是一件  
大事

彭真  
一九九二年三月

彭真题词

Inscription by PENG Zhen



宋任窮題詞  
Inscription by SONG Renqiong

精心操作 嚴格管理  
質量第一 安全第一  
敬贈秦山核電站

宋任窮一九九二年四月二十三日

金山銀星閃閃  
中一白雲騰核電  
光天仗祖國添新  
程

秦山核電廠  
張愛萍一九九二年四月二十三日

張愛萍

張愛萍題詞  
Inscription by ZHANG Aiping



江泽民、李鹏视察秦山核电站

JIANG Zemin and LI Peng inspecting the Qinshan NPP

李鹏、邹家华视察秦山核电站  
Li Peng and ZOU Jiahua inspecting  
the Qinshan NPP







厂址原貌 The original landforms of the Qinshan NPP site



秦山核电站全景 Full view of the Qinshan NPP

# 地理环境

## GEOGRAPHIC ENVIRONMENT

中国共产党诞生地——嘉兴南湖  
Jiaxing South Lake—birthplace  
of the Communist Party of China



嘉兴  
Jiaxing



茅盾故居  
Former residence of MAO Dun

桐乡  
Tongxiang



丰子恺缘缘堂  
Yuan-Yuan Tang—former  
residence of FENG Zikai

海宁  
Haining



南北湖  
South-North Lake

海盐  
Haiyan



钱塘潮  
Qiantang Tide

Shanghai-Hangzhou Highway  
沪杭公路

秦山  
Qinshan

至杭州 92公里  
92 Km from Hangzhou

杭

至上海 126 公里  
126 km from Shanghai

莫家庄园  
Mansion of MO Family



平湖  
Pinghu

金山卫  
Jinshanwei

上海石油化工总厂  
Shanghai Petrochemical Complex



九龙山海滨浴场  
Jiulongshan Bathing Beach



秦山核电站  
Qinshan Nuclear Power Plant

秦山核电站位于浙江省海盐县境内，紧靠沪杭公路，距杭州 93 公里，北距上海 126 公里，面临杭州湾，背依秦山，景色秀丽。交通便利，地处华东电网负荷中心，向电网输电较为实现。

电站厂址地质构造稳定，地震强度低，烈度小，符合安全标准。水源丰富，杭州湾海水可作电站冷却水，附近长山河和南北湖可提供充足的生活和生产用水。

The Qinshan Nuclear Power Plant lying in Haiyan County of Zhejiang Province, is close to the Shanghai-Hangzhou highway, 93 km north of Hangzhou, and 126 km south of Shanghai. It has transport facilities and an attractive landscape with the Hangzhou Bay in front and the Qionshan Mountains behind. Being located at the load center of the Eastern China Grid, it is easy to transmit electricity to the grid.

The stable geologic formation and low seismic frequency and intensity in history at the site meet the requirements of safety standards. Rich water resources are available; the sea water from Hangzhou Bay can be used as cooling water for the plant and the fresh water from the Changshan River and the South-North Lake nearby as living and service water.

州 湾

Hangzhou Bay



秦山核电站是我国自行设计建造的第一座核电站。为了确保其质量和安全,自1974年起便开展了大量研究试验工作,并在此基础上完成了工程设计。参加科研设计工作的有100多个研究所、设计院、制造厂和大专院校,他们完成了反应堆物理、热工水力、应力分析、驱动线对中、核燃料组件、新材料、主设备、仪表、电气、焊接、无损探伤、三废处理、环境评价、安全分析等30多个专业400多个科研设计项目,其中获得国家级和部级成果奖的有140多项。

The Qinshan Nuclear Power Plant is the first nuclear power plant self-designed and self-constructed in China. To ensure its quality and safety, a lot of studies and tests were performed from the very beginning of the project in 1974; and then the engineering design followed. More than 100 research and design institutes, manufacturers and universities, which were involved in the scientific research and design, fulfilled over 400 items in more than 30 specialties such as reactor physics, thermal hydraulics, stress analysis, driving line alignment, nuclear fuel assemblies, new materials, main equipment, instrumentation, electrics, welding, nondestructive examination, radioactive wastes treatment, environmental evaluation, and safety analysis, among which 140 and more items were granted the national and ministerial achievement awards.

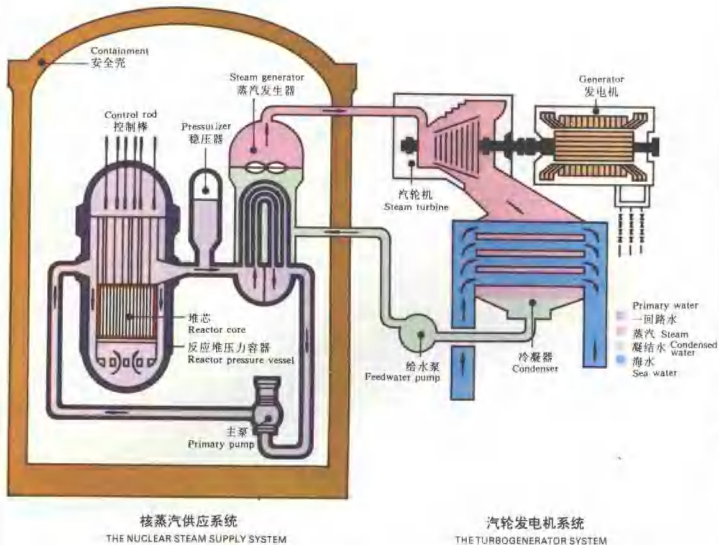
核燃料组件 (宜昌核燃料元件厂制造)  
Nuclear fuel assembly (manufactured by  
Yibin Nuclear Fuel Element Plant)



核电站的燃料是二氧化铀。将二氧化铀制成小圆柱形燃料芯块,装入合金管并加封焊,成为一根根细长的燃料棒。再把燃料棒按行列组排,用定位格架固定,组成燃料组件。格架也称燃料包壳,是核电站防止放射性物质泄漏的第一道屏障。

The nuclear fuel used in the plant is uranium dioxide ( $UO_2$ ). The small cylindrical fuel pellets made of  $UO_2$  are loaded into a zircaloy cladding tube which is sealed by welding, therefore a fuel pin is produced. The fuel pins are arrayed in lines and fixed with grid spacers to form a fuel assembly. The zircaloy tube, i. e. fuel cladding, acts as the first barrier of a nuclear power plant against radioactive leakage.





核蒸汽供应系统

THE NUCLEAR STEAM SUPPLY SYSTEM

汽轮发电机系统

THE TURBOGENERATOR SYSTEM

秦山核电站主要由两个系统组成:

**核蒸汽供应系统** 又称一回路或核岛, 主要由反应堆 (包括反应堆压力容器、堆芯、堆内构件和控制棒驱动机构等)、蒸汽发生器、稳压器、主泵和冷却剂主管道等组成, 核蒸汽在此系统产生。反应堆工作时放出核能, 然后这些核能以热能形式由一回路的冷却剂 (主泵驱动) 带出, 在蒸汽发生器中产生供汽轮机发电机组发电用的饱和蒸汽。

**汽轮发电机系统** 又称二回路或常规岛, 与常规火电厂的汽轮发电机系统基本相同。秦山核电站的汽轮机 (上海汽轮机厂制造) 为饱和蒸汽汽轮机, 有一个高压缸、两个低压缸, 发电机 (上海电机厂制造) 为双水内冷式三相交流发电机, 额定电压 18 千伏, 额定功率为 31 万千瓦。

The Qinshan Nuclear Power Plant is mainly composed of two systems:

**The nuclear steam supply system**, i. e. the primary loop or nuclear island in which nuclear steam is produced, mainly consists of reactor (including reactor pressure vessel, reactor core, reactor internals, and control rod drive mechanism), steam generator, pressurizer, primary pump, main coolant piping, etc. When the reactor operates, nuclear energy is produced and carried over through the coolant in the primary loop (driven by the main pump) in the form of thermal energy; then the saturated steam is generated in the steam generator and supplied to the turbogenerator for generating electricity.

**The turbogenerator system**, i. e. the secondary loop or conventional island, is more or less similar to that of conventional coal-fired power plants. The turbine in the plant, manufactured by Shanghai Turbine Factory, is a kind of saturated steam turbine which has a high-pressure cylinder and two low-pressure cylinders; the generator, manufactured by Shanghai Electric Motor Factory, is a type of triphase AC generator with a double internal water-cooling system, and the rated voltage 18 kV and the rated power 310 MWe.