

THE PRESENT SITUATION AND DEVELOPMENT OF FIRE SCIENCE AND TECHNOLOGY IN CHINA

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ABSTRACT

The article outlines general aspects of development of Chinese fire service. It reviews achievements of Chinese fire science and technology in the past 10 years, with the emphasis on the scientific and technological strength, scientific research facilities, application of scientific and technological payoffs, and development of international cooperation in fire science and technology, forecasts tasks of fire science and technology China will face in the coming decade, and expounds measures to strengthen works of fire science and technology further.

INTRODUCTION

China is a developing country with vast territory and large population, governments of all levels attach great importance to the fire service since the founding of the People's Republic of China. The policy of Prevention First and Combining Prevention with Suppression is implemented in the work of fire protection in China. While strengthening works of fire protection organs, our government brings positive roles of relevant departments and the masses into full play, thereby brings about great developments of the fire service in China and makes important contributions to protection of economical construction and people's lives and properties.

Fire science and technology are always integral parts of the fire service in China, playing important roles in fire prevention and fire suppression.

Along with the advance of the reforms and open in China and guided by the fundamental policy that Economical Construction Must Relying on Science and Technology, and Scientific and Technological Works Must Be Geared to the Need of Economical Construction, modernizing constructions of fire protection and relevant fields, such as urban fire protection facility construction, comprehensive fire fighting capability of the society, fire suppression, administration and technological legislation, manufacturing and improvement of fire protection equipments rely more and more on advance of fire science and technology, so the positions of fire science and technology rise higher and higher in the fire service, and the concept of promoting fire service by fire science and technology is recognized by more and more people. It is a historical tasks of Chinese fire service to develop fire science and technology vigorously.

1 ACHIEVEMENTS OF FIRE SCIENCE AND TECHNOLOGY IN THE PAST DECADE IN CHINA

Works of fire service and technology in China can be summarized into scientific research, scientific and technological administration, and technological works in fire prevention and fire fighting practice.

Conspicuous achievements have been won in all those fields since the reform and open policy being carried out over a decade ago. The following are the main ones as far as scientific research and scientific and technological administration are concerned.

(1) Strength of Scientific And Technological Workers Reinforced

There are four subsidiary fire research institutes and four subsidiary national centers of quality control test for fire protection products under the Ministry of Public Security which is in charge of guiding fire prevention and fire protection works all over the country, namely the Tianjin Fire Research Institute and concurrently the National Center of Quality Control Test for Stationary Fire Protection Systems and Fire Resistive Structural Members, the Shanghai Fire Research Institute and concurrently the National Center of Quality Control for Fire Fighting Equipments, the Shenyang Fire Research Institute and concurrently the National Center of Quality Control for Fire Protection Electronic Products, and the Sichuan Fire Research Institute and concurrently the National Center of Quality Control for Fire Preventive Building Materials. As the backbone of Chinese professional fire research, the four Institutes have 850 people, including 120 senior engineers and 600 engineers, engaged in research of fire theory, engineering fire protection, fire codes, fire fighting equipments and tactics, personal protective technique in fireground, fire suppression theory, fire protection communication, fire detection and alarm, electrical fire, fire retardant technique for material, structural fire prevention technique and so on. Local fire brigades and military police have a lot of qualified fire scientists and technicians too. Moreover, relevant departments, universities and colleges are also engaged in fire research actively in recent years. For instance, a national key laboratory for fire science was established in the Chinese University of Science and Technology, a national laboratory for fire retardant agent research was established in the Beijing University of Science and Engineering, an architectural fire prevention department was established in the Architectural Research Institute of China, a forest fire control department was established in the Forest Protection Research Institute of the Ministry of Forestry, the Far East Fire Test Center was established in the Shipping Register of China, corresponding fire research organs were established or fire research works have been carried out in relevant laboratories in the Qinghua University, the Tianjin University, the Jinlin University of Technology, the Central China University of Technology. A galaxy of experts and professors in those organs constitute an important force of the cause of fire science technology in China.

(2) Important Facilities for Fire Research Established

Research facilities utilizing advanced technology at home and abroad for petroleum fire suppression, electrical and architectural fire, material fire retardance, fire detection and alarm, fire communication, fire fighting equipments and personal protective equipments on fireground and so on have been established in Chinese fire research organs according to their respective specialities. The large-scale test facilities among them are a comprehensive combustion and fire suppression laboratory, a laboratory of fire resistance of structural members, a petroleum fire fighting test area in the Tianjin Fire Research Institute, a laboratory for performance of fire fighting equipments in the Shanghai Fire Research Institute, a test system for electronic products of fire protection and a test facility for electrical fire research in the Shenyang Fire Research Institute, a comprehensive laboratory of smoke ventilation of highrise and a test system for combustion performance of structural material in the Sichuan Fire Research Institute, a multifunctional combustion test furnace for structural members in the Architectural Research Institute of China, a

combustion test furnace for marine components in the Far East Test Center, a fire laboratory in the Chinese University of Science and Technology, a fire retardant material laboratory in the Beijing University of Science and Engineering. Development and utilization of those key facilities of scientific research provides good conditions for researching into fire theory and fire protection technology deeply.

(3) Scientific and Technological Payoffs Widely Applied

While engaged in applied research of fire technology, Chinese scientific and technological workers spare no efforts on high science and technology, opening up research fields for fire theory further. A total of over 500 projects in various fire research fields have been accomplished in the past decade with fruitful payoffs. Some of the payoffs have been transferred to productive forces, some have been applied on engineering construction, on safe reform of hazardous technique, on fire brigades' equipments, on quality control tests of fire protection productions, on fire prevention supervision, and on fire fighting tactics and technique, and some have been used as scientific basis for revision of technological codes, standards of fire protection. The wide application of scientific and technological payoffs not only strengthened the fire resistive capability of the whole society and reinforced the fire fighting power of fire brigades, but also changed the backward aspect of fire science and technology in China.

(4) International Exchange and Cooperation in Fire Science and Technology Actively Expanded

Adhering to the reform and open policy and the principle of equality and mutual benefit, China has expanded scientific and technological exchange and cooperation with international fire academic circle increasingly in the past decade. As participant members of the Technical Committee of Fire Protection Equipment (ISO/TC21) and the Technical Committee of Fire Resistance Test of Structural Material and Members of the International Standard Organization (ISO/TC92) and the Working Group of Fire Protection of the Conseil International du Batiment pour la Recherche, l' Etude et la Documentation (CIB/W14), representatives of China attend relevant meetings, take part in discussions, vote of international standards, and exchange academic these. Academic society and expert organizations such as the Chinese Association for Fire Protection and the Technical Committee of Fire Protection Standardization of China also unfold international academic activities vigorously. In 1987, a fire extinguishing test of large-scale oil tank in Tianjin was sponsored by China and Japan jointly, observed by nearly 200 fire experts from 30 countries. In 1988, an architectural fire prevention symposium sponsored by CIB/W14 was held in Chengdu, China, attached by more than 60 experts from 14 countries. In 1991, the 10th conference of ISO/TC21 was convened in Beijing, with 50 experts from 11 countries present. In 1992, the Ministry of Public Security of China and the Environmental Protection Agency of the United States jointly signed the Protocol of Cooperative Projects on Elimination of Halon Application in China, to Protect the Ozone Layer and Improve Fire Safety. The Tianjin Fire Research Institute is cooperating with the Architectural Research Institute of National Academy of Canada to carry out research on evaluation of fire resistance of residence. In the past decade, only the four subsidiary fire research institutes have sent over 250 person-times abroad for investigation, visit, attending various academic meetings, and over 40 persons studying abroad. Along with increase of international cooperation and exchange of fire science and technology, the closing up situation of Chinese fire science and technology has basically changed, and a new setup of transregional and transnational exchange and cooperation of science and technology has primarily come into being.

2 TASKS LYING AHEAD OF CHINESE FIRE SCIENCE AND TECHNOLOGY

The coming decade is the critical period for realizing the second step of the strategic goal of Chinese modernization construction. In the period, the pace of reforms and open will be hastened, great advances will be gained in national economy and social development, all these will inject vigour and vitality into the fire service.

Along with enlarging of city scale, development of economical and technical, increasing and concentrating of material wealth, continuous construction of highrises, underground engineering and hubs of communications and rapid progress of petrochemical complexes, fire science and technology must develop correspondingly to meet new challenges. According to the 10 year plan of national economy and social development, in the light of the goals and tasks in middle and long terms proposed by the Social Public Safety Section of the Programme for Scientific and Technological Development in Middle and Long Terms of China, and referring to the development trend of international fire science and technology, the development of Chinese fire science and technology will lay emphasis on following key tasks:

(a) studying city fire hazard grading and comprehensive technical systems for fire protection, and researching into fire prevention technology for important public places;

(b) raising fire prevention and protection capability for highly hazardous and technically complicated key objects of protection, and researching into fire and explosion prevention systems, fire alarm, fire extinguishing, explosion suppression and emergency systems, remote control and automatic functioning systems;

(c) developing a variety of new fire fighting equipments with advanced technology to deal with fires of special fireground such as highrise, underground engineering, airplane and marine;

(d) carrying out research on fire and explosion theory, analysing fire hazards of various matters, exploding mechanisms of fire retardance, fire and explosion suppression, researching on fire suppression systems for large space and long distance, developing fire retardant and thermal isolation materials, and researching into the technique of fire cause appraisal;

(e) researching on harm and injury to human body by fire condition and its protective technique.

3 MEASURES FOR DEVELOPMENT OF WORKS OF FIRE SCIENCE AND TECHNOLOGY

In order to accomplish the strenuous tasks laying ahead of Chinese fire science and technology and attain the predefined goal of struggle, we shall take following main measures:

(1) Adhering to the Correct Guide Ideas

Works of fire science and technology must be geared to the needs of economical construction and main battlefields of fire prevention and fire protection practice, must accelerate the reforms and open, and develop themselves through the reforms and open. The administration system and the function mechanism of works of fire science and technology must be reformed under the guidance of relevant general and special polices of the state; the consciousness of fire science and technology must be heightened; the guide idea of developing fire protection cause by advances in science and technology must be

strengthened further and put into practice; the sense of the cause and responsibility of leaders of various levels and vast numbers of workers of fire science and technology must be enhanced, and their enthusiasm to do works better must be brought into full play.

(2) Making Overall Planning, Fully Mobilizing Scientific and Technological Power of All Fields of the Society

Fire science and technology concern a lot of specialities and branches of learning, and serve a wide range of fields. It is especially true for some major scientific and technological projects, which can not be undertook by certain department alone. Therefore, while giving full play to the function of the subsidiary fire research institutes under the Ministry, scientific and technological powers of local fire brigades and relevant departments must be fully mobilized, to give free rein to the superiority of each other and undertake major projects jointly according to the requirements and division of work of an overall planning.

(3) Opening All Fund Channels and Concentrating Strength to Ensure Key Projects

As public welfare cause, fire science and technology are provided with financial guarantee by our government. But the scientific research funds provided by the state are mainly spent on key projects and construction of key facilities for scientific research. Each subsidiary fire research organ should open all fund channels according to regulations of relevant state policy by carrying out technological service, technological consultation, joint development of new products and so on, provided that accomplishment of instructed tasks of scientific research being guaranteed. Investments and financial support from relevant organs of the United Nations, friendly countries and societies should be actively attracted and accepted.

(4) Expanding International Multilateral Cooperation in Science and Technology Actively

At present, the political situation is stable, the society is quiet, and the national economy increases steadily in our country. The situation that the reform and open policy will guide all fields for a long period provide good conditions at home and abroad to the development of fire science and technology in China. Beside carrying out scientific and technological cooperation with relevant departments of Canada, the United States and so on according to the agreements signed, we should expand cooperation and exchange with more countries in wider fields of fire science and technology. Scientific and technological payoffs and advanced experiences of foreign countries should be learned, introduced into China and absorbed, to heighten levels of China fire science and technology and administration, and make our contributions to the cause of international fire science and technology.