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Lectures on gas and liquid chromatography and their application in the measurement of trace organic constituents in complex mixtures in general, and the certification of Standards Reference Materials in particular at the East China Centre for Testing Technology

Held at

The Service Centre of Testing Technology in Shanghai

14 - 29 September 1984

ASSISTANCE TO THE SERVICE CENTRE OF
TESTING TECHNOLOGY IN EAST CHINA
DP/CPR/81/030*

FINAL REPORT *

Prepared by

Dr. Willie Eugene May
UNIDO Expert in High Efficiency
Analytical Separations Techniques
under the post 11-03

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Serial

Report to the United Nations
Industrial Development Organization on Special Service
Assignment at the Shanghai Institute for Testing Technology

Willie Eugene May
National Bureau of Standards, Gaithersburg, MD 20899
United States of America

I. Details of Assignment

- (a) Position Title: Expert in High Efficiency Analytical Separations Techniques
- (b) Duties: To consult and lecture on gas and liquid chromatography and their application in the measurement of trace organic constituents in complex mixtures in general, and the certification of Standard Reference Materials in particular at the East China Center for Testing Technology, Shanghai, China.
- (c) Dates of Assignment: September 14-29, 1984.
- (d) Schedule of Events in Shanghai:
 - Sept. 16 Sight-seeing in Shanghai (am)
Discussion of lecture schedule (pm)
Visited Botanical garden (pm)
 - Sept. 17 Toured Shanghai Institute of Testing Technology (am)
Lecture: "NBS: It's History, Mission and Organizational Structural" (pm)
 - Sept. 18 Lectures: Overview of the NBS Organic Analytical Research Division (am)
HPLC: Basic Principles and Instrumentation (pm)
 - Sept. 19 Lectures: GC: Basic Principles and Instrumentation (am)
Qualitative and Quantitative Chromatographic Analysis (pm)
 - Sept. 20 Lectures: Quantitative Analysis of Complex Mixture using Selective Detection I (am)
Visited Shanghai Jade Carving and Carpet Factories (pm)
 - Sept. 21 Lectures: Quantitative Analysis of Complex Mixture using Selective Detection II (am)
Results from Several Interlaboratory Comparison Studies (pm)

(a) Lectures Given in Shanghai

I presented a total of thirteen lectures during my stay in Shanghai. One lecture was presented before the Shanghai Metrological and Engineering Society. All other lectures were given at the Shanghai Institute of Testing Technology. The lectures were given in English with sentence-by-sentence translation into Chinese by Mr. Du Jia Wei. Lectures were typically three hours in length including questions and discussions. Titles for the lectures have been given previously in 1d. The lectures were tape recorded and some photographs were taken of the slides and transparencies used. There were numerous questions and discussions both during and after the lectures. Reprints describing the material covered in the lectures were also distributed. A list of the people who attended the lecture series at the Shanghai Institute for Testing Technology is given in Attachment II. Approximately 135 people attended the lecture given before the Shanghai Metrological and Engineering Society.

(b) Impressions of the Chromatographic Activities at the Shanghai Institute of Testing Technology

Chromatographic research and/or measurement are not major activities at the Institute at this time. However, Mr. Chiang Chih Chang is a very capable scientist with previous experience in both liquid and gas chromatography. There are also a core group of young and energetic assistant engineers who appear, with proper additional training and exposure, to be capable of establishing a more than respectable chromatographic research program and measurement capability at the Institute.

3. Summary and Recommendations

My lectures included an overview of the history and current organizational structure of the National Bureau of Standards, and covered basic theory and principles involved in chromatographic processes as well as some advanced topics in this area, quantitative trace organic analysis, and discussions concerning the current state-of-the-art in this frontier area of analytical chemistry, preparation and certification of Standard Reference Materials, and determination of physico-chemical properties using chromatographic methods. I felt that, with Mr. Du's assistance, I was able to communicate adequately and that my lectures were well received. I was approached during each break period for comments and/or discussions concerning material from the lectures. Mr. Chiang seemed pleased with my contributions.

Approximately half of the people attending my lectures at the Shanghai Institute of Testing Technology appeared to be between twenty and forty years of age. They appeared to be bright, though lacking the exposure and the experience of their counterparts in the West.

I feel that the UNIDO program is certainly worthwhile and of great benefit to the Chinese people. I feel that the program would be improved by additional communications between the host institution and the visiting scientist(s) prior to arrival. Information concerning the background: duties and responsibilities of the scientists scheduled to attend the lectures would allow the lecturer(s) to more adequately prepare themselves to render lectures at the appropriate levels. I feel very strongly that teams of lecturers rather than single individuals would provide a better means for information transfer. Preparing and delivering thirteen separate three-hour lectures within a two-week time period is an exhausting experience for a single individual. A two-person team would collectively bring along more information and experience(s) and provide a more rested and alert "expert" for each lecture.

My stay in Shanghai was a very pleasant, interesting and enjoyable experience - one that I'll never forget. My hosts were very gracious and provided me with as much assistance as was humanly possible. I feel that the UNIDO program is an ideal vehicle for the scientific and cultural exchange necessary to promote industrial and economic development in China.

Attachments

Attachment I

Listing of Analytical Equipment Seen at the
Shanghai Institute of Testing Technology

I list here the equipment I was shown along with approximate dates of installation.

Varian AA-775 atomic absorption spectrometer (1979)

Hitachi 180-80 atomic absorption spectrophotometer (1983)

Jarrell-Ash Atomocomp Series 1100 inductively coupled plasma spectrometer and computer system (1983).

Varian 5000 liquid chromatograph with 5 detectors (including Varian Fluorichrom uv fluorescence detector), Varian CDS 401 computer, and Apply IIe computer (1983).

Varian Vista 6000 gas chromatograph (1983)

Finnigan MAT 251 mass spectrometer and Apple IIe computer (1982)

ARL five-channel wavelength-dispersive electron-probe microanalyzer with 100A resolution and PDP1104 computer (1980)

JEOL JM6 transmission electron microscope (100 kV, 7A resolution)

Zeiss Epiquant optical microscope and image analyzer

Zeiss IMA-10 laser spectrometer

AEI MS 702 spark source mass spectrometer (1972)

Japanese x-ray diffraction unit (1966)

Perkin-Elmer 599B infrared spectrophotometer and computer

Cameca SMI 300 ion microprobe (1973)

Perkin-Elmer Physical Electronics 550 Scanning Auger microprobe, x-ray photoelectron spectrometer, uv photoelectron spectrometer (UPS) rapid-insertion probe, and computer data system (1980).

Attachment II

LIST OF PARTICIPANTS IN DR. MAY'S LECTURE

<u>Name</u>	<u>Sex</u>	<u>Title of Post</u>	<u>Address</u>
Chiang Chih Chang	Male	Senior Engineer	Shanghai Institute of Testing Technology
Wang Gen Rong	Male	Assistant Engineer	Shanghai Institute of Testing Technology
Huang Wei	Female	Assistant Engineer	Shanghai Institute of Testing Technology
Bao Hui Xin	Female	Engineer	Shanghai Institute of Testing Technology
Jiang Wen Lian	Female	Engineer	Shanghai Institute of Testing Technology
Feng Feng Di	Female	Engineer	Shanghai Institute of Testing Technology
Ji Bai Liang	Male	Engineer	Shanghai Institute of Testing Technology
Hua Yong Yi	Female	Engineer	Shanghai Institute of Testing Technology
Zhu Jin Feng	Female	Engineer	Shanghai Institute of Testing Technology
Shi Guo Hao	Male	Assistant Engineer	Shanghai Institute of Testing Technology
Zu Yung Gang	Male	Assistant Engineer	Shanghai Institute of Testing Technology
Huang Hai Xing	Male		Shanghai Institute of Testing Technology
Li Jing	Female		Shanghai Institute of Testing Technology
Sun Hua Li	Female	Engineer	Shanghai Institute of Testing Technology
Bao Zhu Di	Female	Assistant Engineer	Shanghai Institute of Technology

Fan Jia Shu	Male	Assistant Engineer	Shanghai Institute of Testing Technology
Wu Ying Wan	Female	Engineer	Shanghai Institute of Testing Technology
Yang Shu Ping	Male	Assistant Engineer	Shanghai Institute of Testing Technology
Zhou Chen Nan	Female	Lecturer	East China Institute of Textile Science and Technology
Li Gui Zheng	Female	Lecturer	East China Institute of Chemical Technology
Li Yi Feng	Female	Engineer	Shanghai Rubber Products Research Institute
Shen Shen Ji	Female	Engineer	Shanghai Rubber Products Research Institute
Li Guo Wei	Male	Teacher Assistant	East China Institute of Textile Science and Technology
Bo Shi Cai	Male	Engineer	Shanghai Chemical Reagent Research Institute
Mao Shun Yuan	Male	Engineer	Shanghai Petrol Chem. Comple. Institute
Jiang Xiao Seng	Female	Engineer	Shanghai Synthetic Resin Institute
Sun Li	Male	Assistant Engineer	Analysis Determination Center of Zhe Jiang
Lin Qing Qiang	Male	Engineer	Fu Jian Institute of Testing Technology
Wu Yong Hua	Male	Engineer	Shanghai Dye Research Institute
Liu Buo Ping	Male	Teacher Assistant	Analysis Determination Centre of Jiang Xi Province
Wang Peng	Male	Assistant Engineer	The Centre of Physical and Chemical Testing of Province Jiang Su
Huang Ping Feng	Female	Engineer	Shanghai Pharmaceutical Industrial Institute Analytical Division

Hua Yun Cai	Female	Engineer	Shanghai Pesticide Research Institute
Han Qi	Female	Assistant Engineer	Shanghai First People's Hospital
Zhang Jue Jun	Male	Engineer	Shanghai Grain Food Research
Qi Yun Tsi	Male	Research Assistant	Shanghai Institute of Entomology
Su Hong	Female	Assistant Engineer	Shanghai Research Institute of Environmental Protection
Cheng Yu Rong	Male	Assistant Engineer	Shanghai Input and Export Commodity Inspection Bureau
Zhu Sheng Shen	Female	Engineer	Shanghai Input and Export Commodity
Wu Xing Re	Female	Assistant Engineer	Shanghai Input and Export Commodity
Zhao Hong	Male	Assistant Engineer	Shanghai Petrochemical Research Institute
Fan Ying	Female	Assistant Engineer	Shanghai Textile Research Institute
Gu Jing Jing	Male	Teacher Assistant	Shanghai Second Medical Colleg
Wang Shi Ping	Female	Assistant Engineer	Shanghai Coating Research Institute
Shao Rong Kong	Male	Engineer	Test Center of Medical Research Shanghai Municipal Health Bureau
Pan Guo Sheng	Male	Assistant Engineer	Shanghai Surface Coating Research Institute
Du Jia Wei	Male	Engineer	Shanghai Institute of Entomology