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**ORNL**  
**FOREIGN TRIP REPORT**

ORNL/FTR-3642

**DATE:** June 20, 1990

**SUBJECT:** Report of Foreign Travel by C. P. McGinnis, Manager, Hazardous Waste Program, Chemical Technology Division

**TO:** Alvin W. Trivelpiece

**FROM:** C. P. McGinnis

**PURPOSE:** Technical exchange, including the presentation of five lectures on waste management practices at Oak Ridge National Laboratory (ORNL) and the U.S. Department of Energy (DOE), to the staff members of the Taiwan Institute of Nuclear Energy Research (INER). The visit included tours of waste treatment and waste packaging operations at INER and of the waste incinerator at the Taipower Nuclear Power Station.

**SITES**

|                 |           |  |                      |  |
|-----------------|-----------|--|----------------------|--|
| <b>VISITED:</b> | June 4-11 | Taiwan Institute of Nuclear Energy Research (INER) | Lung-Tan, Taiwan ROC | Ying-Chu Hoh, Head Chemical Engineering Division |
|                 | June 8    | Taiwan Power Company                               | Shihman, Taiwan ROC  | Paul C. T. Shen, Manager, Radiation Laboratory   |

**ABSTRACT:** The traveler, as a guest of Taiwan Atomic Energy Council Institute of Nuclear Energy Research, presented five invited lectures on waste R&D efforts at Oak Ridge National Laboratory (ORNL) and the U.S. Department of Energy (DOE) to the Taiwan Institute of Nuclear Energy Research (INER). Tours of INER waste treatment facilities were provided, and general discussions concerning ORNL-INER interactions were held.

Visits were also made to the Taipower Nuclear Power Station Radiation Laboratory and the Low-Level Waste (LLW) Incineration Facility. The tour of the National Lan-Yu Storage Site was canceled due to inclement weather.

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## REPORT OF FOREIGN TRAVEL TO TAIWAN ROC

C. Phil McGinnis, Manager,  
Hazardous Waste Program, Chemical Technology Division

### 1. INTRODUCTION

The visit to the Taiwan Institute of Nuclear Energy Research (INER) resulted from discussions between R. G. Wymer and Y. C. Hoh concerning continuing cooperation between INER and ORNL. The traveler was invited to present technical seminars of work at ORNL to INER. All travel costs were paid by Taiwan INER. Traveler's labor cost was funded from NC40-370 funds provided by the U.S. Department of State as part of activities in the International Technology Programs Division in support of safeguard and other nonproliferation activities.

### 2. INSTITUTE OF NUCLEAR ENERGY RESEARCH

The traveler was met by the management of INER at a luncheon meeting where strong ties with ORNL were praised and acknowledged. Hosts provided a general introduction of INER, and specific tours of waste handling facilities were conducted. The waste handling facilities appeared to be modeled after similar DOE facilities. Health physics and safety appeared to be stressed to about the same degree as at ORNL. The traveler was provided with a conference room and time to review the material for presentation before formal seminars were conducted on June 5, 6, and 7.

All the seminars were well received by INER, with approximately 20 people attending each session. The following topics were discussed:

1. Overview of the Talks and Nature of the United States Waste Problem,
2. ORNL Current Waste Management Practices,
3. ORNL Waste RD&D Supporting Current Operations,
4. Oak Ridge Environmental Restoration Program, and
5. DOE Long-Range Plans.

Several in-depth technical questions were asked, and the staff was anxious to learn about the waste projects under way at ORNL. The traveler explained the separation of Environmental Management and the Office of Civilian Radioactive Waste Management since this had presented some confusion to the guests.

INER was notified, on June 4, of a substantial budget cut for technical studies. However, Dr. Hoh noted that the funding for waste technology development would not be decreased due to the increasing importance of this effort. Recent protests by citizens groups on waste issues have raised the priority of this area at INER. Management had several meetings concerning budget impact during the visit.

Individual discussions were held with staff engineers. INER is very interested in the ORNL Integrated Data Base (IDB) and the Characteristics Data Base (CDB) of the Chemical Technology Division and has requested a copy of the CDB. The staff members were interested in ORNL design criteria for warehousing TRU wastes, specifically the required air exchange rate and typical negative pressures found in similar storage facilities at ORNL. Several questions were asked about the Oak Ridge TSCA Incinerator. The technical questions were detailed and quite thorough.

### 3. TAIWAN POWER COMPANY

The traveler was escorted by Ben Pen, of INER, in a tour of the Radiation Laboratory and low-level waste (LLW) handling facilities at the Taipower First Nuclear Power Station. An overview of the power station was given via a professionally produced multimedia show, with specific details being provided by Mr. Shen, Manager of the Radiation Laboratory. Facilities were similar and appeared to be modeled after those at ORNL. Mr. Shen stated that the laboratories were certified and that they exchange samples with several U.S. laboratories, including ORNL. Management requested a copy of the ORNL Environmental Monitoring Program for their use. Taipower hosted a lunch for the traveler with several Taipower technical staff members.

An afternoon visit was arranged to a new LLW treatment facility. This facility, with a cost of greater than \$15,000,000 (U.S. dollars), was undergoing cold testing prior

to hot operation. The design appears to be well conceived and implemented. Packaged wastes with radioactivity levels of  $<200$  mR/h are fed at 100 kg/h to the incinerator. Ash is solidified with bitumen and stored at the site. Supercompaction is used to reduce the waste volume of nonincinerables. Equipment, which was state of the art, had been procured from Europe (Belgium and Germany) and the United States. The traveler was invited to photograph the equipment, and these photographs are available. The staff members were quite knowledgeable and helpful.

#### 4. GENERAL DISCUSSIONS, INER

I met with both Dr. Wang (INER Deputy Director) and Dr. Hoh (Director, Chemical Engineering Division) for general discussions. Each wanted to know my impression of the facilities at INER. I responded that they appear to be modeled after ORNL and to be well managed. Both managers mentioned the recent budget cut but confirmed that funding for the noted program in waste R&D will remain at the same level. INER is very interested in Martin Marietta Energy Systems' waste minimization program and requested that any available information be forwarded to them.

Dr. Hoh is leading a delegation coming to Knoxville in October 1990 to attend the Spectrum '90 Meeting and requested that a tour of the TSCA incinerator and other waste operations at K-25 be arranged during that visit. He will be accompanied by Dr. Chien, Taiwan Power Waste Division Head; Dr. Chen, Taiwan Power Waste Division Deputy; and Mr. Tsao, Radwaste Authority Manager.

Dr. Hoh mentioned that INER will be sending two new staff members to ORNL for 6-month assignments during FY 1991 (beginning July 1990). Dr. Jimmy T. Bell (Chemical Technology Division) is coordinating the assignment. Dr. Hoh thanked me for the five lectures and noted that his staff will study the waste reports that I provided.

## 5. CONCLUSIONS AND RECOMMENDATIONS

The INER operates technically as a U.S. power generator support laboratory, looking to the United States for technical standards, knowhow, and advice. My visit served two purposes: (1) it provided them technical information about the DOE and ORNL waste programs, and (2) it continued to build on the close working relationship already in place between the INER and ORNL.

Routine operations appear to be well run and to meet the safety and quality assurance standards of ORNL. INER needs additional technical help in the handling and storage of hazardous waste, LLW, and spent fuel. Their staff working at ORNL is attempting to learn more of these areas, and the staff in Taiwan is sending questions raised during the trip discussions to their counterparts from INER at ORNL. We should continue to provide as much information as possible to these visiting engineers. They are technically competent and are trying to learn from our experiences.

## APPENDIX A. ITINERARY

|                |   |
|----------------|---|
| June 2-3, 1990 | Travel to Taiwan ROC  |
| June 4-7       | Meeting at the Taiwan Institute of Nuclear Energy Research                  |
| June 8         | Tour of Taiwan Power Company Facilities                                     |
| June 9         | Tour of Lan-Yu Radwaste Storage Site<br>(canceled due to inclement weather) |
| June 10-11     | General discussions with INER   |
| June 12        | Return to Knoxville, Tennessee  |

## APPENDIX B. INDIVIDUALS CONTACTED

Ying-Chu Hoh, Head, Chemical Engineering Division, INER

Jen-Chang Chou, Director, INER

Wei-Ko Wang, Deputy Director, INER

Jim-Shiung Horng, Associate Head, Chemical Engineering Division, INER

John S. Chern, Associate Head, Chemical Engineering Division, INER

Chia-Pao Tung, Associate Head, Chemical Engineering Division, INER

Chih-Chien Chang, Engineer, Chemical Engineering Division, INER

Ben Pen, Engineer, Chemical Engineering Division, INER

Paul C. P. Wang, Engineer, Chemical Engineering Division, INER

Dr. Chen, Engineer, Chemical Engineering Division, INER

Dr. Chiu, Engineer, Chemical Engineering Division, INER

Bruise K. F. Tsai, Head, Radwaste Treatment Plant, INER

Tise-Sheng Chou, Commissioner, Committee on Appraisal, INER

Paul C. T. Shen, Manager, Radiation Laboratory, Taiwan Power Company

Rong-Jyi Ke, Deputy Manager, Radiation Laboratory, Taiwan Power Company

Andrew Wang, Incineration Engineer, Taiwan Power Company

John H. S. Yang, Deputy Project Manager, Chemical Engineering Division, INER  
(Technical Support at Taiwan Power Company)

F. C. Chang, Deputy Director, Analytical Chemistry Division, INER

## APPENDIX C. LITERATURE ACQUIRED

1. Institute of Nuclear Energy Research 1989 Annual Report, February 1990.
2. Environmental Monitoring Program of Nuclear Power Station, Radiation Laboratory of Taiwan Power Company (updated brochure and report).
3. Radiation Protection and Environmental Safety of Nuclear Power Stations (brochure), Taiwan Power Company, May 1987.
4. Taipower Nuclear Operations 1987 Report.

## APPENDIX D

## Tentative Schedule for C. Phil McGinnis' visit from ORNL

| Date    | Activities  |
|---------|---|
| June 3  | Arrival   |
| June 4  | Monday<br>10:30 Visit Director and Deputy Directors<br>11:00 Schedule Discussion, CED<br>Noon Lunch, hosted by Director Chou<br>Monday Afternoon<br>13:30 Multi-media Introduction of INER<br>14:00 Laboratories Tour |
| June 5  | Tuesday<br>10:00 Overview of the Talks and Nature of the Waste Problem<br>13:30 ORNL Current Waste Management Practices   |
| June 6  | wednesday<br>10:00 ORNL Waste RD & D Supporting Current Operations<br>13:30 Oak Ridge Environmental Restoration Program   |
| June 7  | thursday<br>10:00 DOE Long Range Plans and Review of the Five Year Plan   |
| June 8  | Friday<br>General Discussion  |
| June 11 | Leaving   |

註：

一：時間：七十九年六月五日至六月八日計四日

二：地點：042館305室