

シニアネットワーク連絡会（SNW）セッション

原子力人材育成公募事業「世界最高水準の安全性を実現するスーパーエンジニアの育成」

MEXT Nuclear education project: To be a Super Engineer to Realize the World Class Nuclear Safety

(4) シニアとの対話会・米国研修で得たもの

(4) Meeting with Senior Members and Students for the Super Engineer's Training in Japan and US

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1. Introduction

Super Engineer program is a leading program of Hokkaido University established by Prof. Tadashi Narabayashi which consisted of local training in Japan and finally select five excellent students in the nuclear department and related field from university all over Japan to participate an annual internship in the United State of America for two weeks. The program aims to train participated students to be the next super engineers whose help solving and restart Japan's nuclear power plant. Experiments and lectures provide knowledge and experience in nuclear engineering as well as the discussion with senior engineers, nuclear personnel, and other field students which allow participants to broaden their point of view and ask any curious questions. I am one of a few international students who join the local training in Japan and only one international student whom been selected for US internship. However, with many helpful and kind supports, I have memorized these opportunities as one of the best experiences as a nuclear engineer student. Accordingly, this work aims to share experiences of the mentioned discussion with senior engineers and nuclear personnel from Japan and US. Program.

2. Super Engineer's Training in Japan

The training program in Japan which is mentioned in this work is the Development of Super Nuclear Engineers to Achieve Safety at the Highest Global Standards held at Hokkaido University on August 1st to 5th, 2016. The training included some lectures on nuclear topics, disaster prevention robot practicing, Tomari nuclear power station visiting, and discussion with Japanese senior engineers. The discussion with Japanese senior engineers allowed students to ask some questions not only about the nuclear knowledge but also their experiences, expectations, and opinions on the current nuclear industry in Japan.

From the discussion about the situation after Fukushima accident, CLI (commission local information), which is the discussion process between utility company, local people, and government, are planned to be applied in Japan. Currently, in Hokkaido, only paper publication and talking session in the limited area have been used which might not be good strategies, especially to gain trust after Fukushima accident. However, in order to solve the bad image of nuclear industry after the accident, time is still the key to the solution together with continuous safety development. The safety has been planned to develop with passive safety idea for shutting down and another process. By this idea, there is no electricity required but natural gravity and circulation will be involved. The problem on the safety development has been stated of the large scale of the facilities required which cause high construction cost and will affect to country's economic situation. In the current situation, senior engineers showed their concern about the shortage of electricity and carbon emission in the near future. To illustrate, before Fukushima accident, Tomari power station which has 3 reactors can produce 44% of Hokkaido electricity while combustion was involved only 8%. However, after the accident, a rapid increase of carbon emission was reported because the nuclear station was forbidden and combustion re-open to respond the same demand as well as the higher cost of fuel. In the case of waste management, Japan decided to recycle nuclear waste because of limitation in resource and area while Sweden and the US chose the spent fuel disposal deep underground. The big concern of recycling is the terrorism by using the recycle product which contained plutonium for produce nuclear weapon.

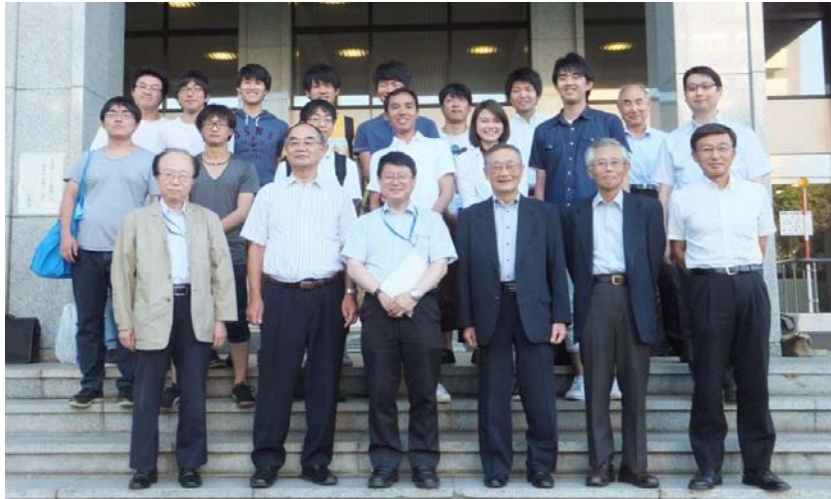


Figure 1 Japanese Senior Engineers and Super Engineer's Students

3. Super Engineer's Training in the US

After the local training in Japan, five students were selected together from different university around Japan, namely, from Hokkaido, Tokyo, Tohoku, and Osaka, to participate the internship in the United State of America for 2 weeks and this year was held on January 8th to 22nd, 2017. All participants joined ISOE symposium, and nuclear power plants visiting with kindly support from Dr. David Miller. All the schedule allowed participants to discuss and received valuable experiences.

3.1 ISOE Symposium

ISOE (Information System on Occupational Exposure) Symposium is an annual meeting for Sharing Information between ALARA (As Low As Reasonably Achievable) person who working with the radiation and nuclear plants which included paper presentations, RPM (radiation protection manager) meeting, and special mentor meeting for super engineer's students. The discussed topics are mainly about the current situation of those plants, safety, and new technology in order to reduce dose rate in work place and the public. Moreover, this year, they celebrated the 25th year ceremony of this symposium with the highest number of participants and country including Japan and Thailand as shown in Figure 2.



Figure 2 Memorial Picture of Participants in ISOE Symposium, January 9th to 11th, 2017

During the symposium, there are many interesting opinion and quotes from both speakers and participants which I, personally, would like to share in this work as mentioned below.

- Nuclear is required to provide the largest contribution to Global electricity in 2050., William D. Magwood, Nuclear Energy Agency, France
- Transparency and reliable operation is not to evaluate the process but the progress of the licensee., Terry Jamieson, CNSC Ottawa, Canada

- “Flexible” can help prevent accident by adapting process related to situation., Shinichi Kawamura, TEPCO, Japan
- Human always explore somewhere of something we did not know before and that come up with the driver of development in science and technology., Dr. Dennis Chamberland, NASA, USA
- Information defection effect to our mind is worse than the radiation defection., Prof. Narabayashi Tadashi, Hokkaido University and Super Engineer Program, Japan
- Nuclear power is special and unique., Bob Porter, TEPCO, Japan

After the symposium, personnel from many plants and companies have kindly volunteered to be mentors for the individual student of super engineer program for keeping good contacts and advice. During the short time discussion, both mentors and students received and exchanged some idea about the important point of working in the nuclear field. It was one of the most impressive activities which keep long relationship and connection between working person and students whom soon will step into the working life. Moreover, RPM meeting was held which is mainly for managers who specialize in radiation protection for sharing and discussing some situation, new policy or related information in order to reduce dose rate in work place and the public.

3.2 US Nuclear Power Plants Visiting

By the strong support from Dr. David Miller, super engineer participant allowed to visit four nuclear plants which are Donald C. Cook, LaSalle, Dresden, and Clinton and had great discussions with managers, workers, and engineers in all plants.

3.2.1 Donald C. Cook Nuclear Plant

This Plant located near to the Lake Michigan, Bridgman, Michigan. Our group first visited their visiting center which provides some knowledge about nuclear and reactors through simulation and movies as shown in Figure 3 and had a chance to meet Mr. David Wood, president of the plant. They have 2 units of PWR reactor with ice condenser operated by American Electric Power (AEP). Their main motto is “Zero Harm We Care” to remind every worker work safely. Moreover, every worker in this plant work based on a 2-minute rule which is the 3 ways communication, inform actions (by the 1st party), repeat actions (by the 2nd party or supervisor) and understand actions (by the 1st party again) before every action to prevent the accidents and mistakes. Mr. John Carlton also shared his experiences on environmental management. The plant faced some problems of the unexpected death of the school of the fish problem in the lake Michigan that cause the problem of water filter pipe and the changing of the temperature in the lake in the different season that causes the cooling system problems.



Figure 3 Pictures in Donald C. Cook Nuclear Plant's Visiting Center

(Left) Mr. David Wood, president, in the middle,

(Right) Mr. John Carton, Environmental Engineer, on the most right

3.2.2 LaSalle County Generating Station

The plant located in Marseilles, Illinois. They have 2 units of BWR Mark II operated by Exelon. We met and talked to Mr. John Moeser and other engineers who gave us a lot of great vision as shown in Figure 4. Their current target is to eliminate source term of non-tenacious crud, contained Co-60 that occur from Spinel materials part consist of a high concentration of ferrous iron, in order to reduce dose rate in work place and contamination to the pipe and turbine. This plant brought a lot of new technology that we normally use in real life to develop their safety such as 360fly VR, the 360 degrees' camera for taking picture in work place for the training and inspection, and VOCERA phone, the speaker phone using in plant's WIFI area that allows the immediate call both internal and external dials by the voice control.



Figure 4 Picture with Mr. John Moeser (in the middle) in LaSalle County Generating Station

3.2.3 Dresden Generating Station

Only about 30 miles away or 40 minutes by car from LaSalle, we visited Dresden on the next day as shown. This plant has 3 Units of BWR Mark I which Unit I is the 1st commercial unit in the USA but now is under decommissioning operated by Exelon. Because of the surrounding by Illinois river of the 3 side of the plant, they pay attention to the flooding security. Mr. Harry Bush Jr. told us about his point of view and some other important information and joined us the tour in the control area as shown in Figure 5. They use FLEX facilities that have the same kind of connection of pipe line and other emergency equipment and easy to transport with the other plant to prevent the accident and easy to help each other from the lesson learned of Fukushima Accident. Isolation condenser (IC) has been used for the cooling emergency case. Moreover, Mr. Ronald whom guiding us inside of reactor area was a mark that "Time Motion Study" with the field worker is important to reduce the working time which also brings the dose rate reduction.



Figure 5 Picture inside of reactor control area in Dresden Generating Station
with Mr. Harry Bush Jr. (with the golden Helmet)

3.2.4 Clinton Power Station

Clinton Power station, Illinois was our last nuclear plant visiting. We were guided by Mr. Robert Egan and Mr. Daniel Schlapkohl as shown in Figure 6. They have only 1 unit of BWR Mark III operated by Exelon which, from the dosimeter data, have the lowest dose (0.1 mR) in the reactor area during the tour compare to LaSalle and Dresden (about 0.4 mR). We had a chance to visit inside of the control area and stand above the reactor with water shielding for 23 feet which allow us to see some part of the reactor. They will have some decommissioning plan this year that brought them focusing on outage and safety during the outage.



Figure 6 Picture in Clinton Power Station with the Engineers

4. Conclusions

Super Engineer Program is a leading program from Hokkaido University established by Prof. Tadashi Narabayashi which aims to train students to be super engineers whose will be able to solve Japan's nuclear industry. Both local trainings in Japan and US provide chances on discussion with senior engineers, nuclear personnel, and other field students which allow participants to broaden their point of view and visions. After Fukushima accident which causes a huge effect on the nuclear industry all over the world. The most important strategy is to create a good communication way from both among nuclear person, with the public, and also pass to the nuclear-developing country. Nuclear will still play the important role in electricity generation for more than 50 years. By participation in this program, the necessary and advantages of communication and safety are illustrated to all participants.

5. Acknowledgements

These opportunities would not be this pleasure without main supports from Prof. Tadashi Narabayashi and Super Engineers Program, Hokkaido University along with all lecturers, Tomari plant, and Japanese senior engineers who participated in local training in Japan. For the training in the US, I would like to show my appreciation to Dr. David Miller, Donald C. Cook Plant and the University of Illinois, participants and mentors from ISOE symposium, all US plants, and related person. Finally, I would not have a chance to receive these great opportunities without strong supports from my advisor, Prof. Toyohiko Yano, and Assoc. Prof. Katsumi Yoshida, Department of Nuclear Engineering, Tokyo Institute of Technology and Mr. Anggi Budi Kurniawan, my classmate, whom invited and shared me the information of these training.