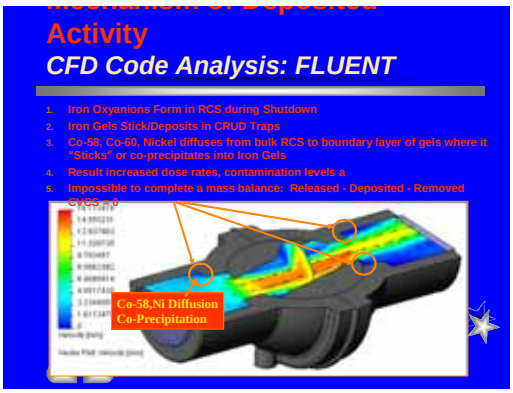
Overview of international occupational dose trends

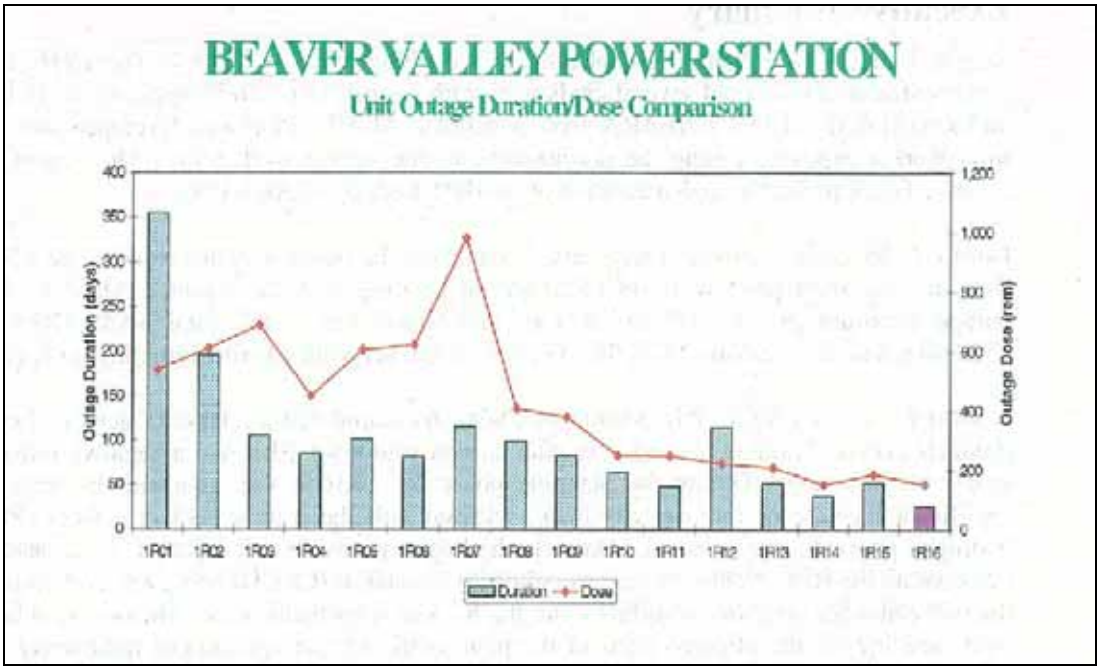
“North American Occupational Dose Trends”

Dr. Miller (North American Technical Center) reported on the occupational dose trends in North America. The average exposure dose per reactor for BWR in the United States in 2004 was 1.56 person・Sv/unit, which was the second lowest level since 1969. Meanwhile, the average exposure dose per reactor for PWR was 0.71 person・Sv/unit, which was decreased by 22% compared with the previous year and the lowest (best) level ever recorded since 1969. The opinion exchange through ISOE contributed to the exposure dose reduction. The main contribution to the exposure dose reduction was shortening of outage duration (refueling and maintenance). The usage rate of the nuclear power plants in the United States has improved greatly from 70% in 1991 to 90% in 2004. This is equivalent to the additional electricity generated from new thirteen 1,000MW plants.

An enough prior planning was important to shortening the shutdown time. The United States learned the work management techniques during shutdown from Europe (Finland). Other approach of ALARA includes source term reduction, work efficiency improvement and water chemistry controls during operation and shutdown. The plants at Turkey Point and St. Lucie are using the resin for filters which was developed at Los Alamos National Laboratory, and it gets good results of removal of the low density Co (in particulate form) that are assumed to accumulate in the narrowed part of pipes during shutdown. This resin is also used at the Peach Bottom and Monticello plants, and shows the improvement. The ALARA principle is important for measures of making longer life of plants, including improving the efficiency of operations and reducing exposure in replacing reactor vessel heads or inspecting bottom heads. The worker's fatal accident occurred at the Browns Ferry plant three weeks ago (a lead shield material of 800kg fell down). It is important to share the operating experience through ISOE to prevent accidents like this.



As an example of the result of the exposure dose reduction activity in the United States, the change in exposure dose from the 1st shutdown to the 16th outage with refueling and result of analysis of exposure dose of each working group are shown below for the exposure dose at Beaver Valley Unit 1. As the result of continuous approach for exposure dose reduction, the lowest exposure dose was achieved during the 16th outage with refueling.



Beaver Valley Power Station 1R16 Exposure Distribution

Group	mSv	%
Construction Vender	658	67
Refuelong Vender	145	15
Eddy Current Vender	118	12
Radiation Protection Vender	103	11
Mechanical Vender	100	10
Project Management	78	8
Building Services	74	8
Operations	48	5
Radiation Protection	44	5
I&C Maintenance	37	4
All Others	230	
TOTAL	1635	