"OECD/NEA/CNRA International Workshop on Impact of Year 2000 on the Nuclear Industry" hosted by AECB, Government Conference Center, Ottawa

Regulatory Strategy and Status for the Y2K Readiness Programme of the Nuclear Power Plants in Korea

1999.2.9

**Choong-Heui Jeong, Senior Researcher** 

Instr. & Control Dept., Korea Institute of Nuclear Safety P.O. Box 114, Yusong, Taejeon, Republic of Korea, 305-600



- I. Background
- II. Regulatory Strategy for Y2K Readiness Program of NPPs
- **III. Regulatory Actions**
- IV. Licensee's Y2K Readiness Program
- V. Evaluation and Audit for Licensee's Activities
- VI. Major Issues
- VII. Posterior Plan
- VIII. Conclusion

## I. Background (See Fig. 1)

#### • OGPC(Office for Government Policy Coordination)

- ➢ kicked off "The Year 2000 Conversion Council", on April 17, 1998
- ➢ issued "The Executive Directions of the Year 2000 Conversion"
- designated NPPs as one of the 10 key critical sectors

#### • MIC (Ministry of Information and Communication)

- established "The Year 2000 Project Office"
- ➢ implemented the Action Plan for the nation- wide resource mobilization

#### • NCA (National Computerization Agency)

- started to support the Government Directions as the Y2K Project office for Korea
- ➢ has executed the Action Plan of the MIC by opening "Y2K Support Center"

#### • MOST (Ministry of Science and Technology)

- ➤ was nominated by OGPC as the leading authority for nuclear safety against Y2K problems
- established Task Force Team for Nuclear Facilities on April 24, 1998, to support policy making for Y2K problems, to present status/plan and discuss pending problems

#### **II.** Regulatory Strategy for Y2K Readiness Program of NPPs (See Fig. 2)

- Regulatory Action
  - requesting licensee to establish a Y2K readiness program, to implement the program, and to report the stepwise implementation outputs
- Evaluation of Submittals
  - to evaluate licensee's activities with submittals which should be handed in following the Regulatory Action
- Site Audit
  - to evaluate the effectiveness of measures licensees are taking to identify and correct Y2K problems at their facilities
- Research Project
  - to develop assessment guidelines for the licensee's Y2K readiness program and the implementation outputs
- International Cooperation
  - to survey current status, to discuss pending issues, and to exchange regulatory experiences

## **III. Regulatory Actions**

#### issued by MOST, based on recommendations of KINS, on July 29, 1998 requesting the Submittals with a Time-Frame

- Ist Submittals (No later than August 20, 1998)
  - Y2K Readiness Program including organization, staffs, milestones, and bills
  - Inventory List classified into safety facilities, control facilities, monitoring facilities, and the others
  - Initial Assessment Report including the list and functions of facilities influenced by Y2K
- 2nd Submittals (No later than October 15, 1998)
  - Detailed Assessment including vendor/utility evaluation results, Y2K impacts on facilities, and remediation plans
  - Test and Validation Plan/Quality Assurance Plan
- 3rd Submittals (No later than June 30, 1999)
  - Certificates confirming the Y2K readiness of facilities including the results of testing and validation
  - Schedule of remaining- readiness actions
  - Contingency Plan

#### **IV. Licensee's Y2K Readiness Program and Implementation Activities**

#### Licensees

- **KEPCO**: manages unclear power plants, 14 units in operation and 6 units under construction
- ➢ KAERI: operates a research reactor, Hanaro, 30 MWe
- ➢ KNFC: manages a nuclear fuel factory

#### **KEPCO's response**

- organized the Y2K Task Force Team in Nuclear Power Division of Head Quarter, in July 1998
- set up the Y2K Readiness Program, based on the guideline, NEI/NUSMG 97- 07 "Nuclear Utility Year 2000 Readiness" (see Fig. 3)
- finished the Detailed Assessment, recently

#### **Results of the Detailed Assessment**

- No Y2K problem in a few digital- based safety facilities (ex, NPS, CPCS, PCS, ICCMS, SDS#1/2)
- Major facilities and off- line equipment affected by Y2K problems
  - Control Facility: Liquid Radwaste System(LRS), SG Level DCS
  - Monitoring Facility: radiation monitoring system, plant computer system, etc.
  - Test Equipment: Recorder, Analyzer, S/W Configurator, etc.

#### **Statistical Summary of the Detailed Assessment**

- Non-Compliant Facilities/Equipments
  - 108 out of 726 assets
  - No Safety Facilities, 3 Control Facilities, 42 Monitoring Facilities, etc. (see Table 1)

Impact	Compliant	Impacted Facilities or Equipment			Total
Туре		Ready	Non-Compliant	Sub Total	
Safety	11	3	0	3	14 (1.9 %)
Facilities					
Control	52	22	3	25	77 (10.6 %)
Facilities					
Monitoring	57	63	42	105	162 (22.3 %)
Facilities					
Other	28	31	9	4	68 (9.4 %)
Facilities					
Off-line	124	227	54	281	405 (55.8 %)
Equipment					
Total	272 (37.5%)	346 (47.7 %)	108 (14.9 %)	454 (62.5 %)	726 (100 %)

#### Table 1. Statistical Summary of the Detailed Assessment

## V. Evaluation and Audit for Licensee's Activities

#### Evaluation for the 1St Submittals; in September 1998

- Submittals: Y2K Readiness Program, Inventory List, Initial Assessment Report, Applied Guidelines
- General Comments
  - KEPCO's Y2K Readiness Program were practically and systematically established based on the NEI guideline, NEI/NUSMG 97-07 "Nuclear Utility Year 2000 Readiness" that could be effectively used in Korea.
  - Their activities were well forwarded according to the Program.
  - Inventory Survey and Initial Assessment were adequately performed.
- Supplementary Requests (1st Supplements)
  - Increase of Personnel Dedicated to Y2K Project
  - Adjustment of Schedule for the Establishment of Contingency Plan
  - Supplement of Inventory
  - Provision against Invalid Embedded Systems: survey, check, diagnose, plan
  - Provision against Unstable Electrical Grid System

#### Audit for Wolsong Nuclear Power Site Division; in November 1998

#### Object: Wolsong Units 1,2,3,4

- Status of Y2K Readiness Program: Organization, Implementation Progress, and Contingency Plan
- Test: DCC, GEM(Gas Effluent Monitoring System), and Seismic Monitoring System
- Document Review: SDS1/2 PDC, Mark- V, and Fuel Machine Pressure Controller
- General Comments
  - The Y2K Readiness Program, set up by the Task Force Team at the KEPCO Head Quarter, is generally well implemented at the Wolsong Site Division.
  - The certificates for the Shutdown System PDC Computers, which were provided by AECL, give us much assurance that no Y2K problem will impact on Safety System.
  - The forwarded progress assures us that Control/Monitoring systems, assessed as Y2K Non- Compliant, would be bug-free before July 1999.
- Supplementary Requests (Supplements for Wolsong)
  - Establishment of Software Configuration Management Plan
  - Establishment of the Contingency Planning Schedule
  - Supplementary Assessment for GEM

## **Evaluation for the 2<sup>nd</sup> Submittals; in December 1998**

- Submittals: Detailed Assessment Report, Test and Validation Plan, and Quality Assurance Plan
- General Comments
  - the Detailed Assessments were adequately performed
  - the Quality Assurance Plan is well established, except for some weak points.
- Supplementary Requests (2nd Supplements)
  - Establishing Management Plan for Temporary Compliant Facilities
    - Plant Annunciation System: ~ 2027.12.31
    - CEDMCS (Control Element Drive Mechanism Control System): ~ 2030
    - MOVATS (Diagnostic System for Motor Operated Valve): ~ 2038
  - Establishment of Oversight Plan in QA plan
    - planned periodic audits, or
    - inspections at documented hold points
  - Adjustment of Resolving Schedule for Some Facilities: within June 30, 1999
    - Workstation for Core Follow in UCN 3,4
    - Radiation Detecting System in UCN 3,4

## **VI. Major Issues**

#### Temporary Measures

- Date Back and Windowing Approach
  - Date Back (Envelope): setting the system date back 28 years to extend the life of the equipment
  - Windowing: inserting a logic to window the dates, allowing the program to interpret the century as 19 or 20 based on parameters defined by user or programmer
- Review Points
  - maintaining the two-digit-year format to save cost and time
  - possibility of problems known or unknown
  - management plan for later change to prevent "time bugs" if ignoring the base year
  - allowable criteria for the applicable facilities: the importance of facilities and/or the impact of Y2K
- KINS Position
  - The temporary measures as a remediation should not be applied to Control and Monitoring systems important to safe and stable operation.

## **Simulated Functional Test for Safety-Related System**

- Digital-based Safety Systems
  - NPS in Kori 1: NSSS Protection System
  - CPCS in YGN 3,4 and UCN 3,4 : Core Protection Calculation System
  - ILS in YGN 3,4 and PCS in UCN 3,4 : Interposing Logic System for BOP-ESFAS
  - ICCMS in YGN 3,4 and UCN 3,4 : Inadequate Core Cooling Monitoring System
  - SDS#1/#2 PDC in Wolsong 1,2,3,4: Shutdown System #1/#2 Programmable Digital Comparator
- Assurance of safe and stable operation
  - only from document analysis such as system manuals or vendor's responses
  - no validation test because of no tool to set time for the safety-related facilities, except ICCMS
- KINS Position
  - Testability to verify the safety function under year 2000 simulation should be reviewed
  - Every safety- related facility should be functionally tested under year 2000 simulation, unless it were demonstrated the test is impossible.

## VII. Posterior Plan

#### **Evaluation of Submittals**

- Supplementary Detailed Assessment Reports; soon
  - prepared by KOPEC, a major contractor for the Y2K Project
- ➢ 3rd Submittals; in July 1999
  - Certificates confirming the Y2K readiness, including the results of testing and validation
  - Schedule of remaining- readiness actions
  - Contingency Plan

#### Site Audit

- Ist round: YGN, Kori Site
  - to confirm that no Y2K problem impacts on the safety- related facilities
- 2nd round: Wolsong, UCN, YGN, Kori Site
  - to validate the function of major facilities remediated
  - to check the effectiveness of contingency plans

## **VIII.** Conclusion

# •We expect that all Y2K issues can be resolved before July 1999, considering the progress forwarded by the licensee.

#### •Major Issues, of which regulation degrees have to be reviewed carefully

- Temporary Measures: Date Back, Windowing
  - cost and time
  - potential problems such as another "time bugs"
- Simulated Functional Test for Safety-Related System
  - Assurance gained from the actual functional test under Year 2000 simulation

### •To obtain perfect assurance of safe and stable operation of NPPs against the challenge of Year 2000, we will perform

- A thorough Audit for Validation Tests at the Sites
- ➤ A proper review of the major issues
- > The in- depth evaluation of 3rd Submittals including the Contingency Plan