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The Y2K Issue in Sweden

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This paper is written to be presented at the Y2K seminar held at the IAEA HQ in Vienna, February 1-5, 1999.

Introduction

This paper will give an overview presentation of the work performed in Sweden on the Y2k issue. The paper will describe in summary how the work is done at the utilities, some lessons learned and the work performed by the regulatory body, the Swedish Nuclear Power Inspectorate, SKI.

Since the prime objectives of this seminar is to focus on potential problems associated with safeguards of nuclear materials and physical protection of such materials and facilities, the report will elaborate these areas in particular. However, SKI does not see that there are any specific needs for assessing safeguards or physical protection issues differently then any other issues related to safety and availability of an individual utility for problems raised by the Y2K issue, whether associated with Process, Technical or Administrative systems.

The paper will also discuss how the reporting and accountancy has been changed to meet the Y2K at the Swedish State Authority as well as at the Swedish nuclear facilities. Furthermore the paper will describe how the Y2K is dealt with in the accountancy software delivered by Sweden to some of the NIS countries.

There is also one section in the paper describing the Physical Protection issue.

The Project Y2K Handbook for nuclear power plants

General

The Y2K project has been underway since mid 1997. The work is carried out according to methods documented in procedures, instructions and reports, all of which are assembled in a Project Y2K Handbook. The purpose of the handbook was to serve as an aid in guiding and co-ordinating the subprojects and for activity managers in the project. The project was organised and staffed during 1997. During the planning phase, all departments and units at the utility were informed of the impending work.

The project is divided into subprojects such as; Process Systems, Technical Systems and Administrative Systems, and three phases: phase 1 – pilot study, phase 2 – inventory, analysis and assessment, phase 3 – actions.

The project's objective are; maintained reactor safety (documented and with no uncertainties), maintained personal safety, no disruptions in production and no other serious disruptions.

The project has progressed according to plan and phase 2 is completed, except for some minor areas. Phase 3 has been initiated to the extent that orders for actions have been placed with those that will implement these actions.

Process systems

The Process System subproject is responsible for ensuring that all systems/components linked to processes are dealt with.

Basic inventory was carried out in late 1997 according to the instructions in the Project Handbook, by the respective reactor units' operation and maintenance departments, through meetings and interviews with system managers to utilise their knowledge of the processes and familiarity with components.
Additional checks, were carried out during 1998, using as a starting point information produced during the original PSA analyses, to ensure that the selected methods of inventory taking have identified all systems and components that can be affected by the millennium transition.

Technical systems

The subproject Technical Systems encompasses the computer infrastructure. It includes the PC network's hardware and system software as well as technical application programmes. This group also includes the unit's process computers, plant security computers, and dosimetry and chemical systems.

Priorities

Setting priorities for necessary corrective actions has been based on applicable functional classification of electrical equipment, in which systems/components with safety functions will be given highest priority in the continuing work.

Phase 2 – inventory, analysis and assessment

A number of procedures and method descriptions have been developed to ensure high-quality work for the various stages. During inventory, the plant register has been searched for equipment containing process electronics, software and/or hardware. Components that may contain date fields, plus a number of details about the component, have been noted in a database. During the inventory process, system and component specialists have been interviewed and documentation from plant modifications has been examined.

In conjunction with the inventory process, all components have been placed in different risk classes, depending on if the component belongs to a system that can affect reactor, and personal or operating safety.

In order to compile information on the identified components, suppliers have been requested to fill in a questionnaire. Their answers have been registered in a database. After the information has been compiled, it is dealt with in assessment groups comprised of specialists from operation, maintenance, electronics, design, computers and quality areas. All assessments are documented and registered in the database.

To ensure that all relevant equipment is examined, an independent study of safety-related equipment is carried out as defined by the Technical Specifications and Final Safety Analysis Report. Specialists from operation, maintenance and technology areas, who have not previously been involved in Y2K, perform this study. As an additional measure, the spare parts warehouse is also examined.

Phase 3 – Actions

Phase 3, Actions, has started

Responsibility for carrying out the actions necessary to ensure compliance of equipment found to be unsafe lies with the reactor unit's system manager, as is the case with all plant modifications. When these actions are carried out, the quality procedures used for maintenance and plant modification work are observed. Implemented actions will be documented and registered in the database.

Several hundred inquiries have been made to suppliers, approximately 90% of which have been answered so far. This might result in a delay of the analysis or it might be necessary to replace some systems due to a lack of information about them.

No major problems have been identified so far during the course of inventory and analysis.

Emergency preparedness

In response to the possible risk of disruptions in offsite power, water supply or other necessary systems due to the millennium transition, emergency plans will have to be drawn up.

Accountancy and Reporting

General

■ Reporting

Most states and organisations as well as facilities are using computer programs for reporting inventory and inventory changes. In many of these programs the dates are presented as a six figure combination, YYMMDD. The inventory changes are usually sorted by date. As a date starting with 00 will be a lower figure than any date starting with some other combination the sort order will not be working.

There might also be some programs that are using the combination 00 for some kind of error message and in these cases this might cause a problem.

The easiest way to deal with the problem is probably to make some changes in the programs and present the date as an eight figure combination, YYYYMMDD. This change will take care of both the sort order problem and any eventual problem with error messages.

■ Measurements

SKI has no instruments or measurement equipment of its own. All measurements needed are performed by using the operator's equipment. In order to find out the situation for the equipment at the facilities, SKI have asked the operators to declare the situation in regard to the Y2K issue on the operators measurement system. The deadline for the declaration to SKI is February 15. The answers received so far indicate that the facilities have taken the appropriate action in this matter.

Reporting and Accountancy at different facilities and organisations

IAEA

The IAEA has in its reporting requirements, code 10, requested that the date is reported using six figures. This implies that all states reporting to the Agency by data files is using the six figure presentation in their out put file to the Agency.

The IAEA has requested Reporting Member States and organisations to inform the Agency whether they are going to be reporting dates in six or eight figures. The IAEA will be handling the incoming reports in their system.

Euratom

For the EU countries, reporting to Euratom, the presentation of the dates are also requested to be six figures. There has not so far been any instruction to the facilities concerned to make any changes in this respect. Therefore it can be anticipated that the problem will be solved in the computer program used by the Euratom for the information received from the facilities.

Swedish State Level System

The Swedish SSAC has been operating since 1970. Reporting between the facilities and the State Authority (Swedish Nuclear Power Inspectorate – SKI) has been done by using the Inventory Change Document (ICD) and Physical Inventory Listings (PIL) on hard copy. Since the beginning all information have been stored on SKI's computer from where all relevant reports have been produced.

In 1991 Sweden introduced a system for reporting on electronic media. For this purpose two types of data files were defined, one for inventory changes and the other for inventory listings.
The ICD should then be forwarded to SKI on both hard copy and diskette. For reporting of the PIL only diskette was requested.

All major Swedish facilities modified their reporting systems to be able to produce the data files. Thus, all facilities and the SKI could exchange the relevant safeguard information in a very smooth way. When these data files were defined, the entries for date required 8 digits and therefore the reporting system in Sweden has been prepared for the year 2000 already from 1991.

When Sweden 1995 joined the European Union, the system of reporting safeguard data to the IAEA was changed. The facilities have, according to the Euratom regulation, to report directly to Euratom and Euratom prepares the reports to the IAEA. Previously the SKI had made the reporting to the IAEA by using the information transmitted from the facilities on ICDs and PILs.

The SKI still requires getting ICDs and PILs from the facilities in order to keep a national register on all nuclear material in Sweden.

The SKI system is based on a 4GL-tool running on a UNIX-server and is of course secured for Y2K. Previously, the system used MAC as clients but is now modified to run on PC. This created an opportunity to check the software again, i.e. that all dates are handled so they are treated correctly when the change of millennium occurs.

Swedish Facilities

The Swedish Nuclear Power Inspectorate has sent out a request to the Swedish facilities asking them if their systems for safeguards are designed to meet the year 2000, and if not how they intend to solve this. According to the information we have received so far, all facilities in Sweden will be ready to meet the year 2000 without any problems.

Actually, two of the facilities will switch to new accountancy systems. Barsebäck and Oskarshamn Nuclear Power Plants are changing into a complete new system for accountancy. The new system, presently under development, is a completely object oriented 32 bits computer program written for windows 95 and windows NT.

NIS Countries

When the work started in 1992, under the Swedish Non-Proliferation Support Programme, to help the NIS countries to develop accountancy systems the year 2000 problem was already taken into account.

Therefore all the reports between the facilities and the state Office are using an eight figure representation of the dates. The out put files from the state systems, requested by the IAEA, are however formatted in accordance with the code 10 labelled format.

The programs used in these countries at the moment was developed in the beginning of 1990's and uses a six figure representation of the dates internally, but is able to simulate eight figure representation for reporting purposes. These programs are now being rewritten in a 32 bit fully object oriented language, Visual Objects, for Windows 95 and Windows NT.

Software for accountancy has been developed for Kazakstan, Lithuania and Ukraine. In all these countries both state systems and systems for accountancy in several facilities have been submitted.

A State system for Latvia is also going to be provided by Sweden in 1999. This system is of course also going to be developed for Windows and meet the requirements for the new millennium.

Physical Protection

As described earlier the Swedish approach to the Y2K issue is that it should be treated at a utility level and that the need to take measures e.g. related to physical protection should be identified in that process.

Apart from the general conclusions made so far by SKI concerning the ongoing projects at the utilities the following observations can be made with respect to physical protection.

Not surprisingly the analysis has shown that the computerised security systems, the access control system and alarm handling either have to be upgraded to be Y2K secure or replaced.

Installations of replaced systems or upgrades of existing systems should be made as early as possible in order to allow for appropriate tests before putting the systems into full operation before year 2000.

The functions of the Central Alarm Station, CAS, and the technical surveillance equipment at the facilities have been analysed and where appropriate necessary corrective measures have been taken. Special attention has been given to the function of independent power supplies and communications systems.

If an (telecommunication) operator cannot guarantee the function of a communication service alternative means of communication have to be considered. (In rare cases one might even turn up with basic solutions such as using a courier to get a message through.) Furthermore, communication systems both internal and external may be vulnerable to disturbances. Since the capability to communicate is essential for the physical protection this is an important issue. The biggest problem lies with communication services supplied by public operators.

The Swedish system for physical protection of nuclear facilities is based on the assumption that the National Police act as the armed response force in case of an incident. Thus, there is a need to ensure that communications between the nuclear facilities and the local police force will work despite Y2K. This problem is being addressed through discussions between the involved parties. Furthermore SKI has been assured that the radio communication system used by the police will be Y2K secure.

Finally it is quite clear that despite all measures taken to prevent the potential Y2K problem there will be a need to have personnel on emergency duty on the night of December 31 1999. This will be the case both on facility level including guard forces and at the regulatory body SKI and certainly the police authorities.

Conclusions

Lessons learned

Of course there are a lot of small lessons learned but the main ones are;

It takes time, both in work hour but also in calendar time to perform identification, analysis and corrective actions.

The fault does not always occur at the time transition. The system can work as normal, but when a disturbance is introduced the system behave in a faulty way. That makes it very important that the test procedures are designed to take this into account.

It is important to identify and analyse equipment that is not a part of the plant but is used by contractors for maintenance of plant systems. This equipment is mostly not documented in the plant documentation system which can make them hard to find. One way is to interview the maintenance personnel.

The typical type of problems that have been seen is mostly not in the main function of the system. It is mostly the operator's terminal and its communication that are the problem, not its
safety function.

The review of the regulatory body

The legal situation in Sweden is clear. The operator of a utility has the sole responsibility for all aspects of safe operation of the plant, including non-proliferation issues, and the Regulatory Body, SKI, has the responsibility to assure itself that the Operator takes his responsibility. This means that SKI, who does not have resources, required reviewing in detail all solutions to actual technical problems, concentrating its effort on ascertaining that the Operator of a plant actually fulfils his responsibility.

Ones every half year the SKI formulates its conclusions, based on the reviews and inspections of the work performed by the utility, of the situation in a report that is sent to the government.

In the report that was sent to the government in September 1998 the Inspectorate made the following conclusions:

1. Problems encountered with the new millennium will not pose a threat to reactor safety.

2. Steps are being taken to minimise the risk of disruptions in operation

3. The work carried out by the licensees is serious, well organised, with well-structured work methods.

4. The work performed is planned to allow adequate margins in the event of unexpected problems.

5. Steps are being taken to minimise the risk of external events affecting reactor safety or availability.

6. At present, no further directives to the licensees are necessary and work can proceed as planned.

In September 1999 there will be a detailed review of the situation, especially on the safety systems at the plants as part of the final review and conclusions of the situation. If the Inspectorate is not satisfied with the situation the actual utility can be forced to perform additional actions or to close the plant down.

Review of accountancy and reporting systems

In regard to accountancy and reporting, the actions that can be recommended to countries that have not started the procedure with year 2000 can be stated as follows;

- replacing the hardware with hardware that is Y2K-guaranteed
- replacing database management system to a new version that is Y2K-guaranteed
- prepare the reporting system to use 8 digits for the dates
- examine the software for possible hard coded date treatment
- test the system as much as possible