DEVELOPMENT OF STATE COMPUTERISED ACCOUNTING SYSTEM FOR NUCLEAR MATERIAL
IN THE SLOVAK REPUBLIC AND THE CZECH REPUBLIC TOWARDS 2000

XA9952484

Stanislav BEZÁK, Alica BENCOVÁ
Nuclear Regulatory Authority of the Slovak Republic, Trnava, Slovak Republic
Vladimír CÍSAŘ, Marie ZAJÍCOVÁ, State Office for Nuclear Safety, Czech Republic
Jan BÍLEK, Jan OLŠANSKÝ, BIOS ltd., Czech Republic

Abstract

The presentation describes the evaluation of computerised system for processing of safeguards data and reporting to the IAEA in the Slovak Republic and in the Czech Republic in accordance with their Safeguards Agreements. The attention is given to the first code for processing of accounting data, established and operated in the Nuclear Research Institute in Řež in 1980. Further it is concentrated on the code ZÁRUKY, developed as a tool for control of and accounting for nuclear material at the State level in 1992, created on the database system CLIPPER-5 in operational system MS-DOS and operated until now. The general intention is to show and clarify main problems connected with the year 2000 and to share this experience with other colleagues. Possible ways for solution of these problems are listed and necessary regulatory role of the SSACs is presented. Also the main requirements for new code, which should communicate with the database of operators and reflect all limitations specified in their permissions, which should be a system with fully satisfactory safety, strictly defined confidentiality and should allow the access of several users in parallel is described. As a new component of this afford the requirements for reporting in accordance with the Protocol Additional to the Safeguard Agreement is mentioned. It is presented that the code in WINDOSW operation system on a database system ORACLE accepting also new date format "YYYYMMDD" would meet all of these requirements.

1. INTRODUCTION

The former Czechoslovakia acceded to the Non-Proliferation Treaty on July 1, 1968. Confirming the requirements of the INFCIRC/153, Safeguards Agreement between the Government of the ČSSR and the IAEA [1] was signed on March 1, 1972 and entered into force on March 3, 1973. The establishment of the State System of Accounting for and Control of Nuclear Material (SSAC) was based on requirements of the Safeguards Agreement and reflected both national and international objectives. The Czechoslovak Atomic Energy Commission (ČSKAE) was authorised to play the role of SSAC in Czechoslovakia. The legal bases for the SSAC were defined in details in the Regulation No. 28 issued in 1977 by the former ČSKAE.

The maintenance of accounting data and a code for accounting and reporting to the IAEA was established and operated in the Nuclear Research Institute in Řež (ÚJV) using the Computer Programs for SSAC in Czechoslovakia [2]. That code based on the former Code 10 and the document IAEA/STR-59 [3] was created in the year 1980. All information required at that time was processed on a mainframe computer installed in the ÚJV Řež. A number of attempts occurred to

process the SSAC databases on newly installed personal computers at the ČSKAE at the break of eighties and nineties.

2. BASIC INFORMATION ABOUT THE ZÁRUKY CODE

The ZÁRUKY code [5] was developed in co-operation with the BIOS company and the former ČSKAE as a tool for SSAC. Main principles of the code were obtained from an analysis of the current status of the complete computer system exploited at that time [4]. The code was created over the database system CLIPPER-5 in operational system MS-DOS. The program fully reflected all requirements of the IAEA Code 10 and all data prepared for transmission to the IAEA were generated in a Labelled Format. After splitting the former ČSFR, the code was implemented in both new countries, at the Nuclear Regulatory Authority of the Slovak Republic (ÚJD) and at the State Office for Nuclear Safety (SÚJB) in the Czech Republic respectively. The ZÁRUKY code enables to process reports from all users of nuclear material: Inventory Change Documents (ICD), Physical Inventory Listings (PIL), as well as Book Inventory Listings (BIL), Material Balance Report (MBR), General Ledgers (GL) for SSAC and all reports required by the IAEA in a proper format. Many kinds of other useful information necessary for SSAC are generated as well .

To install the code, 640 kB RAM, 40 MB hard disc, colour monitor of the VGA type and at least one diskette mechanics FD are required as a minimum computer configuration. The code prints outputs on a laser printer. The code is adapted to operation in network environment of Local Area Network (LAN), however, with a single user only. The access to the code can be limited to a single network station only, or to a number of stations, by means of tools in the network operating system. The code communicates both in Czech and Slovak languages, represented by the LATIN 2 norm.

From the user's point of view, the most visible modification in comparison with the original code for the mainframe computer, is mainly print manager and help displays. Another significant change is a possibility to search and make changes in the input files ICD and PIL and a possibility to set up a document to a chosen date.

Work with the code is based on interactive work with data in the form of dialogue windows and data tables. After starting the code, the basic menu appears on the display:

* VSTUP (INPUT) - it makes possible to read input files (reports from owners of nuclear material) ICR, PIL and to create MBR

* PREVOD DÁT (DATA TRANSFER) – it performs data transfer from input files into the basic database, generation of a file with a report to the IAEA, generation of a diskette and transmittal form for the IAEA.

* AKTUÁLNE DATA (CURRENT DATA) – it makes possible to correct a line in ICD, PIL and MBD located in database, delete a report, work with exempted material and update BIL.

* ARCHIVÁCIA DÁT (DATA ARCHIVING) - it makes possible to back up and archive data already processed.

* TLAČE (PRINTS) - it makes possible to output from ICD, PIL, MBR, BIL, GL and to search items in database files.

* NÁSTROJE (TOOLS) - they serve to add or extend the capabilities of the code (e.g. data cross-checking, status of non used data, entry of passwords to prevent unauthorised access into the code, definitions of new MBA)

This code stores all dates as character fields and uses date in the format "YYMMDD"

3. PROBLEMS OF THE YEAR 2000

In general the problems of the year 2000 (Y2K) might be divided under some condition into three levels.

The very first one, which can be checked even by laymen, is very strange expression of the Y2K in form "00". It is clear immediately for everyone that such symbol might mean at the same time the year 100, 1900 or 1000 etc. Most of numerical system will red this symbol as the year zero. This first problem can be simply solved by conditioned clarification of this symbol in the system.

The second problem is connected with all procedures crossing the Y2K. From the first view it means procedures for generation of GL and MBR which will be brake down because of inconsistent numerical row expressing sequence of years. Going deep into the safeguards programs, we can see that similar problem will be faced in procedure of cross-checking of transfers, which will cross the Y2K. But also in searching in the time sequences around the Y2K and even in registration of ICD in the time at the relevant actual database. This second problem can be, in our view, solved only by the changed approach in expressing of the year. Replacement of two digits symbol for expression of the year by four digits symbol seems to be very hopeful at least for the time being.

As it was already mentioned the database system of the code ZÁRUKY uses date in the format "YYMMDD". But the system date in this code is for specific reason (comparison of different data from various time sequences when no explicit date is requested by operator but "the last date") created by approximation of actual date plus one year. Such procedure has already caused incorrect results in different jobs of the code after the date December 31, 1998. Simply say the problem of Y2K was speed up for one year. Because of only touching the incorrect date symbol for Y2K the program is loosing ways during its specific jobs and as a consequences announcements like "there is no PIL", "it is not possible to create BIL" etc. are produced.. Some kind of solution, at least temporary one, can one find in the change of a system date and we exactly did it for some jobs. Better solution is putting explicit generation date to input forms instead of implicit creation of MaxDate by program.But using these approaches there is no assurance that there would not be any other consequences of such change. It means to check very carefully every time the behaviour of the code as a whole. That is why we decided that the only correct solution should be the change of the date format from two digits to four.

4. IMPROVEMENTS EXPECTED TO BE MADE TO SSAC

After more than 5 years of its exploitation and several small modifications, decision was taken by the ÚJD SR and SÚJB ČR to upgrade the code. Being based on recent common experience and the IAEA announcement M5.21Circ and following discussion among the ÚJD SR, SÚJB ČR and the BIOS, Czech Republic, a decision was made to develop a completely new code that will use advanced hardware and software. The new code should be able to communicate with the database of operators handling nuclear material and it should reflect all limitations specified in their permissions. It must be created in a operating system with fully satisfactory safety, strictly defined confidentiality and in a system, which allows an access of several users simultaneously. As a new component of the code, a module for reporting in accordance with the requirements of the

Protocol Additional will be incorporated.

New code will be created in the WINDOWS operating system on a database system ORACLE. The code will be developed in a few steps. In the first step a basic version will be developed that will replace the original ZÁRUKY code and will accept new date format. This part will be developed and verified within the particular SSAC by June 30, 1999. Since July 1, 1999 we expect to send to the IAEA reports product by both original and new version of code so that correctness will be verified and continuity of submitted reports will be maintained.

In the next step, a module for issuing licences for handling of nuclear material including associated limitations for the particular users of nuclear material will be incorporated into the code.

An important part of the code will be module that allows to issue licences for import and export of nuclear materials and an application of the Protocol Aditional. We expect to complete these parts by the end of 2000. During the whole period of developing the new version of the code, we acknowledge active participation of competent IAEA staff in individual consultations.

In order the updated code would be sufficiently effective, computer with PENTIUM II type processor will be used with the operating memory of 64 MB, or possibly a higher level.

5. CONCLUSION

Operators of nuclear installations are also aware of this problem and are solving it with their systems. Nevertheless common approach is being elaborated for transmission of safeguards data from operator to the SSAC on magnetic media. Special arrangement shall be done in connection with the receipts of safeguards data coming on the magnetic media from abroad.

The computerised systems for the SSAC in the Czech Republic and the Slovak Republic will be subsequently modified towards the year 2000 to be able to resist all problems connected with this date. But only moment of crossing this date will confirm if really all problems were checked. We hope not to meet any similar problem until year 2999, which is the MaxDate in database system ORACLE.

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LEGAL FRAMEWORK

NON – PROFILERATION TREATY   July 1, 1968
AGREEMENT BETWEEN ČSSR AND IAEA
INFCIRC/173   March 1, 1972
REGULATION ČSKAE No. 28/1977
State System on Accounting for and Control
of Nuclear Material   1977

SSAC SUPPORT

- manual   1977
- mainframe computer in ÚJV Řež   1980
- PC based
            - ZARUKY 2.0   1992
            - ZARUKY 3.0   1999

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ZARUKY 2.0

- MS DOS, CLIPPER – 5

- processing of the reports from users

- BIL, GL for SSAC

- reports for IAEA

- Transmittal Form

- maintenance of the database files

Input	Data Transfer	Current Data	Data Archiving	Print	Tools

Database Reports Status

MBA	sent:	ICR	PIL	MBR	to sent:	ICR	PIL	MBR
SX - E		19	14	15		20		21
SE - H		72	58	59				
SX - I		70	68	69				
SX - L		59	56	57				
SX - M		10	15	16				
SX - Z		27	25	28				

Input	Data Transfer	Current Data	Data Archiving	Print	Tools

Input ICR

Input PIL

Contro

Edit PIL

Preparing and edit PIL

Regeneration PIL

Input PIL from diskette

Database Reports Status

	L	MBR	to sent:	ICR	PIL	MBR
S	4	15		20		21
S	8	59				
S	8	69				
S	6	57				
SX – M	10	15	16			
SX – Z	27	25	28			

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PROBLEM date in format YYMMDD

- generation of GL, MBR

- generation of PIL, BIL

- cross – checking of the data

- searching in the time sequences

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ZARUKY 3.0

- WINDOWS, ORACLE

- accepting date YYYYMMDD

- communication with the database of operators

- issuing licences for handling of nuclear material

- issuing licences for import and export of nuclear material

- application of the Protocol Additional