The Development of NMA Report Creator

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1. Introduction

Nuclear Material Accounting (NMA) is the fundamental safeguards measure for both International Atomic Energy Agency (IAEA) and State System of Accounting for and Control of nuclear material (SSAC).

The republic of Korea (ROK) signed comprehensive safeguards agreement (INFCIR/236) with IAEA in November 1975. ROK has been reporting accounting information on all nuclear materials subject to safeguards under this agreement since 1976.

The accounting information is provided in the form of Inventory Change Report (ICR), Physical Inventory Listings (PIL) and Material Balance Report (MBR). The report forms are designed to reflect all the relevant requirements of the Agency, lend themselves to automatic processing and permit the use of either keywords or codes given in CODE 10 of the General part of subsidiary arrangement to the comprehensive agreement. These report formats are too complicated to be used by facility operators. This seems to be the primary reason of errors in reporting of nuclear material accountancy.

Therefore, a report creator was developed to help facility operators prepare reports and ultimately to improve the quality of the accounting reports.

2. Development of reporting tool

2.1 Requirements for the Development of the s/w

Nuclear facility operators should prepare and submit the accounting reports in the formats specified in Code 10 of the General part of the subsidiary arrangement. However, facility operators in general are not familiar with the formats because they contain a lot of keywords and codes as shown in Figure 1.

That is why preparation of NMA reports is considered as error-prone as well as time-consuming. With the need for the reporting tool recognized, The NMA Report Creator was developed considering the characteristics of each facility through analysis of facility operator's needs.

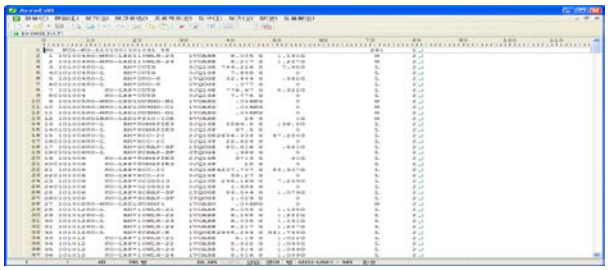


Fig.1. NMA report format

2.2 Development and Operating Environment of the s/w

The s/w was developed using visual C# on Microsoft .NET Framework (Table 1).

Table 1. Development environment of the s/w

Language	Visual C #
Development tool	Microsoft Visual Studio 2008
Component	Infragistics NetAdvantage 2010 vol. 3

It is intended to run on a personal computer (stand-alone) at facilities. The operating environment of the s/w is shown in Table 2.

Table 2. Operating environment of the s/w

CPU	1 GHz
RAM	256MB
HDD	More than 25MB
OS	Windows XP(or above)
Install Prerequisite	Microsoft office 2003 Microsoft .NET Framework 3.5

2.3 Main Function of the s/w

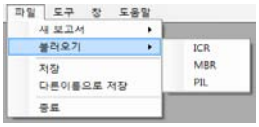
The Report Creator is used in preparation and submission of NMA accounting reports (ICR, PIL and MBR). It also helps facility operators produce high quality reporting data by verifying any syntax or logical errors.

2.3.1 Input Accounting Records

The facility operators can input the data line by line to the software (Fig. 2) or just import the accounting documents in excel form (Fig. 3). The accounting records in excel format, which are familiar to facility operators, can be imported to the software and can be

converted into IAEA report format relieving the burden of facility operators.

Fig.2. Creating an ICR by inputting records



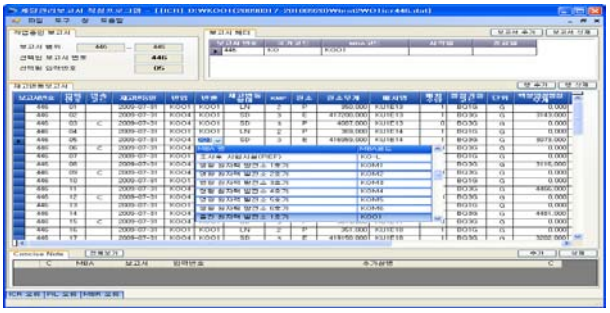


Fig.3. Creating an ICR by importing accounting document

PIL and MBR can be generated automatically from the ICRs during the material balances period and just previous PIL and MBR (Fig.4).

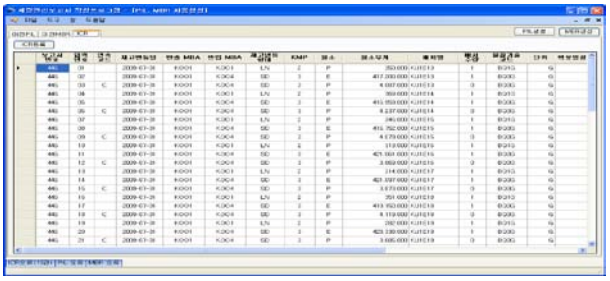


Fig.4. Creating PILs and MBR

2.3.2 Verification of Syntax and Logical Errors

After creating new reports, the software verifies if there are any syntax or logical errors in them. The syntax verification checks whether data format and codes are correct or not and the logical verification checks whether accounting data are correct or not.

Facility operators can detect and correct errors easily with this software because it will issue error messages in case of any errors in reporting data (Fig. 5).

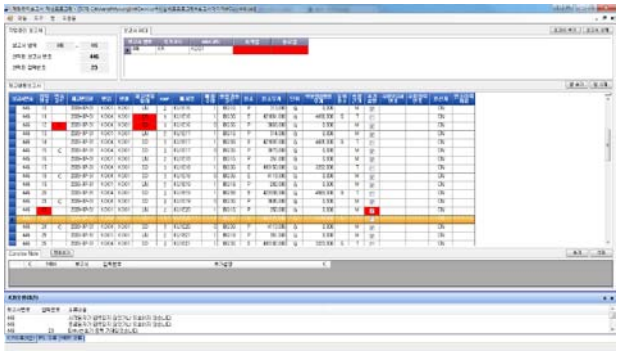


Fig.5. Verification of errors

2.3.3. Exporting Reports

If all reports are prepared correctly, they can be exported into either the submission format or excel format for internal management purpose (Fig. 6).

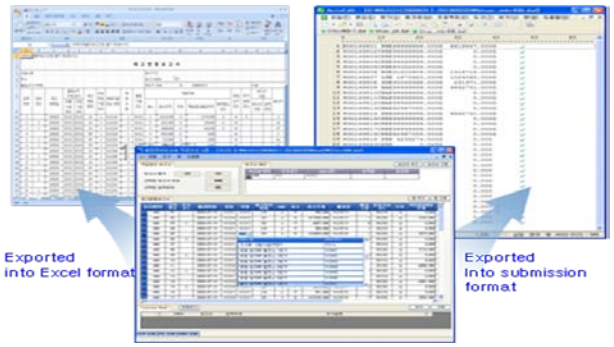


Fig.6. Exporting the final report

3. Conclusion

The NMA Report Creator was developed to facilitate report preparation of facility operators and ultimately to improve the quality of the accounting reports.

This software is expected to enhance the quality of the accounting reports and to improve credibility and transparency of domestic nuclear activities.

REFERENCES

[1] Agreement between the government of the republic of Korea and the International Atomic Energy Agency for the application of safeguards in connection with the treaty on the non-proliferation of nuclear weapons (INFCIR/236), 1975.

[2] Subsidiary arrangement to the agreement between the government of the republic of Korea and the International Atomic Energy Agency for the application of safeguards in connection with the treaty on the non-proliferation of nuclear weapons, 1976.