Retroactive production of EXFOR Masters (NRDC 2023 A91+A92)

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Following Conclusion 5 and Actions 91-92 of the NRDC 2023 meeting, new EXFOR Masters (EXFOR-2015 to EXFOR-2022) were produced with their landing pages and shared with you for your comments:

- main page (https://nds.iaea.org/nrdc/exfor-master/)
- landing pages (e.g., https://nds.iaea.org/nrdc/exfor-master/exfor-2022.html)

Each master is a snapshot of the EXFOR library at the end of the year (e.g., EXFOR-2022 is a snapshot of the EXFOR library on 31 December 2022.). It also includes the latest EXFOR/CINDA dictionary. I plan to release it to the public at the end of this month.

We are still waiting instruction on copyright and license, and I added the following paragraph on the website as the term of use following the first sentence of Conclusion 5:

> The NRDC supports releasing the EXFOR master as Open Data with an acceptable open data license (CC BY 4.0 or similar). When you (1) redistribute it in the original or another form, or (2) use it in a publication,
>
> - indicate the version (e.g., EXFOR-2015)
> - cite the EXFOR reference article (Nucl. Data Sheets 120(2014)272)

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Procedure

EXFOR-2015 was produced from the EXFOR Backup "EXFOR-2015-03-11.bck" (See CP-D/1093 for the reason of this choice) and subsequent trans tapes transmitted by the end of 2015, EXFOR-2016 was produced form EXFOR-2015 and subsequent trans tapes transmitted by the end of 2016, and so on.

Each centre can reproduce a master by using the EXFOR utility codes (See CP-D/1093). Below is an example to produce EXFOR-2015 (exfor-2015.txt) with the backup file EXFOR 2015-03-11.bck as the starter.

```
# Initialize the local storage with the starter file
x4_dirini.py -f -c -l lib/EXFOR-2015-03-11.bck -d entry

# Update the storage with TRANSes with N2=2015mmdd except for TRANS.2244
x4_dirupd.py -f -c -t trans/trans.1405 -d entry
x4_dirupd.py -f -c -t trans/trans.1406 -d entry
…
x4_dirupd.py -f -c -t trans/trans.r028 -d entry
x4_dirupd.py -f -c -t trans/trans.v033 -d entry

# Merge all entries in the local storage to form a master file draft
x4_maklib.py -f -d entry -l lib/exfor-2015.bck -i 2015

# Process the draft for assignment of record identification etc.
x4_seqadd.py -f -i lib/exfor-2015.bck -o lib/exfor-2015.txt
```

I used the date in TRANS N2 to define the year of each trans tape with the following exceptions:

- TRANS.1421 (N2=20161113):

  Added not to EXFOR-2016 but to EXFOR-2017 since TRANS.1420 has N2=20170503 and added to EXFOR-2017.

- TRANS.2244 (N2=20151123):

  Added not to EXFOR-2015 but to EXFOR-2016 since TRANS.2243 has N2=20160209 and added to EXFOR-2016.

- TRANS.2292 (N2=20201223):

  Added not to EXFOR-2020 but to EXFOR-2021 since TRANS.2291 has N2=20210104 and added to EXFOR-2021.

- TRANS.B032 (N2=20211224):

  Added not to EXFOR-2021 but to EXFOR-2022 since TRANS.B033 has N2=20220530 and added to EXFOR-2022.

Such exceptions can be avoided in the future if we use TRANS N2 for the date on which the tape was deposited to the NDS open area. (c.f. CP-D/1089.)

Dictionaries TRANS.9111 to 9128 in new format for master production

To make the EXFOR masters self-defined, they include the latest EXFOR/CINDA dictionary at the end of the year. As the dictionary records have the centre identification character "9" at column 67, they follow the ENDENTRY record of the last neutron nuclear data entry (presently "4") and are followed by the ENTRY record of the first charged-particle nuclear data entry (presently "A").

For retroactive production of the EXFOR masters, I converted TRANS.9111 to 9128 to the new format proposed in CP-D/1092 and uploaded them to the NDS open area as TRANS.9911 to 9928.

Format

An EXFOR master has much the same format as a TRANS tape. It is a logical file (compare EXFOR Formats Manual, Chapter 2 on System Identifiers).

> **MASTER** is the **first record** of the master transmission.
> N1 - Master transmission number.
> N2 - Date of release. The format is: YYYYMMDD
> The record identification contains the centre identification character 1 in column 67 and zeros in columns 68-79.
>
> **ENDMASTER** is the **last record** of the master transmission.
> N1 - Number of entries and dictionaries transmitted.
> N2 - Presently unused (zero)
> The record identification contains a character, whose value is ≥ the centre identification character of the previous record, in column 67 and 9's in columns 68-79.

The differences from TRANS format:

1. The first and last records are MASTER and ENDMASTER. (They are TRANS and ENDTRANS in transmission for data exchange.)
2. Columns 63-66 of ENTRY, SUBNET and NOSUBENT records in the master contain the Trans ID of the last transmission.

Dictionary 1 (System identifiers)

MASTER	First record of a master file
ENDMASTER	Last record of a master file

Changes introduced to original entry

The next table summarizes the changes introduced to the original entries (i.e., those in TRANS tapes) on the NDS open area:

	TRANS	**Master (2015-)**	**Backup (-20230515)**	**Backup (20230523-)**
ENTRY N2	original	original	replaced with N2 of SUBENT 001	replaced with N2 of SUBENT 001
2-digit year in N2	*	converted to 4-digit year	original	converted to 4-digit year
record identification (cols. 67-80)	original	reprocessed	eliminated	eliminated
reprocessing†	no	yes	?	?
N2‡	original	replaced with 0	eliminated	eliminated
N5⁑	original	Trans ID	Trans ID	Trans ID

*: Two-digit year should not appear in a trans tape.

†: Reprocessing for update of N1 and N2 of system identifiers for number of records, keywords etc. and for update of reassignment of record identifications.

‡: Col. 23-33 of ENDBIB, ENDCOMMON, ENDDATA, ENDSUBENT, ENDENTRY and ENDDICT.

⁑: Col. 63-66 of ENTRY and SUBENT.