

**CJD, Progress Report, 2010/2011***Summary of Nuclear Data activity by staff of the IPPE CJD*

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IAEA NRDC Meeting

**“The International Network of the Nuclear Reaction Data Centers”  
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Russian Nuclear Data Center  
(CJD, IPPE, Obninsk, Russian Federation)

**Introduction.**

Since last NRDC-2011 meeting the compilation in the EXFOR and the work on fulfillment of meeting's Conclusions and Actions have been done in the center. But substantial part of CJD activity was related to the nuclear data evaluation.

**1. Staff**

After general reorganization of the IPPE at the end of 2011, CJD is a part the theoretical physics division of the “Center for perspective researches“ in the State Scientific Centre of the Russian Federation – Institute for Physics and Power Engineering named after A.I. Leypunsky – SSC RF – IPPE. At present moment the number of the division staff is 15.

**2. EXFOR activity.**

- CJD continues the scanning of journals of area 4 responsibility IZV, YF, AE, ZET, ZEP, PTE, FCY, FCY/L and major laboratory reports for search of articles and data to be compiled in EXFOR.

- After the NRDC2011 Meeting:

EXFOR TRANSEs 4152-4155 were transmitted as final.

EXFOR TRANS 4156 has been transmitted as preliminary.

**EXFOR compilation statistics – area 4**

TRANS	Date/status	Entries Total	Entries New	Entries Revised	Subents Total	Subents new in old&in new ENTRIES	Subents Revised
4152	/final	34	10	24	157	29+36=65	92
4153	/final	50	2	48	235	24+5=29	206
4154	/final	40	5	35	314	12+29=41	273
4155	/final	26	3	23	152	11+20=31	121
4156	/prelim.	28	3	25	271	18+6=24	247
<b>Total</b>		<b>178</b>	<b>23</b>	<b>155</b>	<b>1129</b>	<b>190</b>	<b>939</b>

- Almost all urgent and very urgent corrections were done according to error list at NDS web-site (as of 30 March 2012)

- The efforts were continued to get numerical data from authors.

Good cooperation was established with authors:

V. Shorin (4RUSFEI);

O. Shcherbakov, A. Vorobiev (4RUSLIN);

Sh. Zeynalov (4ZZZDUB).

### **3. NRDC2011 Actions.**

CJD is responsible for NRDC-2011 Actions: 1, 2, 6, 7, 19, 21, 25, 32, 35, 36.

A1 – almost all very urgent and urgent corrections were made (rest – 2, where articles have not been found yet). Normal corrections will be continued.

A2 – EXFOR CoCoS improvements proposals were discussed, Viktor Zerkin made several corrections according to reached agreement. It was agreed that no need to write Memo.

A6 – Finished.

A7 – Standing action, will be continued.

A19 – Not all Entries of area 4 were corrected for upper into lower case. Will be continued.

A21 – Finished.

A25 – Finished.

A32 – Not all English translations of AE were added, (39 from 222), will be continued.

In these 39 Entries – complex corrections were done in all SUBENTs and all found misprints, mistakes, duplications (not mentioned in NDS error list) were corrected.

A35 – Finished.

A36 – Continuing action.

### **4. Computer and software matters. WEB-site service.**

- New versions of CHEX and EXFOR dictionaries were copied and used in compilation.

- The digitizing program of Sarov is used to digitize graphical data for EXFOR.

- Tool of web-service for compilers (<http://www-nds.iaea.org/exfor/x4up1.htm> , developed by V. Zerkin ), JANIS TRANS checker were used to check TRANSes, found to be very useful and helpful.

- The information from web-site:

[http://www-nds.iaea.org/nrdc/error/exfor\\_err.html](http://www-nds.iaea.org/nrdc/error/exfor_err.html) ,

was found to be helpful for correction of the old Entries.

- <http://www-nds.iaea.org/exfor-master/x4compil/> - EXFOR status compilation web-page CoCoS was used to find the articles for compilation.

- CJD web-site is under reconstruction and it's planned new version of CJD web-site will be available for users at summer 2012 as a part of IPPE web-site.

## 5. Nuclear data evaluation activity.

CJD is involved in nuclear data evaluation process and compilation of nuclear data for the BROND-3 project. The following work was done in 2011:

- For <sup>241,242m,243</sup>Am the evaluation of fission and capture cross sections was done using GMA combined non-model least-squares fit of existing experimental data together with cross sections of neutron standards. The covariance matrices of uncertainties were produced. Also prompt neutron fission yields with covariances were evaluated using GMA approach and delayed neutron yields were evaluated using summation technique with adjustment to existing experimental data on total delayed neutron yields.
- BROND-3A neutron activation library was updated by 560 new data sets for 8 threshold reactions (n,2n), (n,3n), (n,p), (n,np), (n,a), (n,na), (n,d), (n,t) and capture cross section in the energy range up to 20 MeV. Evaluation was based at the systematics of the shapes of different threshold reactions developed at the CJD.
- Using method based at the statistical analysis of the uncertainties and the spread of the experimental data, the evaluated covariance matrices of uncertainties were obtained for (n,f), (n,el), (n,inl), (n,2n) and (n,gamma) cross sections of <sup>242,243,244,245,246,247,248</sup>Cm isotopes. The covariances cover the energy range between 0.1 eV to 19.6 MeV in 34 group presentation. Because of used scheme of analysis the covariances include “unrecognized” systematical component of the uncertainty. The method was used also for evaluation of wide-energy covariances for threshold reactions.
- In cooperation with MEPHI (Moscow) the new evaluations of delayed fission neutrons for minor actinides were performed.
- In cooperation with the Nuclear Safety Institute of the RAS (Moscow) the benchmarks analysis of fissile and structural materials was done using the BFS-62 integral experiments. The results were presented on the last JEFF Meeting (November 2011).

## 6. Nuclear Data Services

In the frame of requests from the Russian organizations the new ace-formated nuclear data libraries for the different temperatures based on the ENDF/B-VII.0, JEFF-3.1.1, JENDL-4.0, JENDL-3.3, ROSFOND-2010, TENDL-2011, BROND-3 (~60 materials) were processed using the NJOY-99 code. The part of this work was presented on the last JEFF Meeting (November 2011) as an example of the JEFF-3.1.1 processed data.

## 7. Journal YK.

- The journal “Yadernye Konstanty”-2010 had been printed and sent in institutes according to distribution list. YK-2011 is in the process of preparation. Abstracts of 1999 – 2009 YK issues (in Russian) are available from the IPPE web-site <http://www.ippe.ru/ninf/pub.php>.

**8. Publications.**

- In during 2010/2011 more than 30 scientific papers were prepared by the staff of the CJD and theoretical physics division (articles, preprints, reports to the Conferences).
- V.P.Bobkov, A.I.Blokhin, L.M.Zabud'ko et al. Editor Prof. V.M.Poplavsky. The Handbook "Guide to the properties of materials for advanced reactor technologies" in two volumes concerning the compilation and evaluation of thermal-hydraulics and nuclear data for liquid metal and gas coolants, Moscow, IzdAT, 2011.
- G.L. Khorasanov, A.I. Blokhin and A.A. Valter. New Coolant from Lead Enriched with the Isotope Lead-208 and Possibility of Its Acquisition from Thorium Ores and Minerals for Nuclear Energy Needs. Chapter 4 in a book "Nuclear Reactors". Edited by Amir Zacarias Mesquita, Published by InTech, 2012, ISBN 978-953-51-0018-8.

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- Mike Herman and all in the NNDC who help us to obtain the last issues of the Nuclear Data Sheets what were distributed to the Russian organizations.