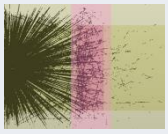
Nucleonica Newsletter

JANUARY 2014 ISSUE 3

In this Issue

What's this photo?
(Science in Art: multiple scattering of gamma radiation (green) in a water (red) shield simulated using Nucleonica's Virtual Cloud Chamber. The colours are inverted to highlight the effects and painted over). More info…



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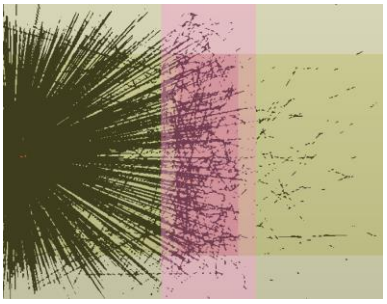
Competence and Knowledge building in Nuclear Science

Dear Users,

In line with our mission to make nuclear education, training and nuclear competence building more effective and interesting for our users, we continue to strive to provide the best and most reliable online tools in nuclear science. Our efforts have been rewarded through an increased number of users in 2013. Special welcome goes to our new institutional users from Princeton USA, Czech Republic and Sweden.



During 2013, we have continuously upgraded the Nucleonica applications with a view to improving user-friendliness and calculation / response times.

In this Newsletter we outline new technical developments on our online portal, the Karlsruhe Nuclide Chart, and give a review of training courses held during 2013.

New Karlsruhe Nuclide Chart Online (KNCO): *It is with great pleasure that we announce the release of a new product – the Karlsruhe Nuclide Chart Online (KNCO). For over 55 years, the Chart has been available only in print versions. This new release of the online version is a landmark in the evolution of the Chart. The major advantage of this new online version is that, through regular maintenance, it will always be up to date to provide you with the latest nuclear data. In this section we describe the main features of this new development.*

What's New in Nucleonica: *Over the past 12 months, the applications Nuclide Datasheets++, Decay Engine++, Dosimetry & Shielding++, e-Ship++ have all undergone major revision. The use of the "++" following the application name denotes the new version. In this section, we describe in more detail the new features of these and other applications.*

Training Courses: *Training courses on the use of the Nucleonica applications have kept us very busy over the past year. Here we provide a short summary of the various courses held in the past year.*

The next Nucleonica training course will be held on 10-11 April 2014 in Karlsruhe - there are still some places available.

We hope you will find this Newsletter helpful and informative and would like to thank all our customers for their support in 2013.

Very best wishes for 2014

Joseph Magill
Managing Director

More information on the Nucleonica Databases

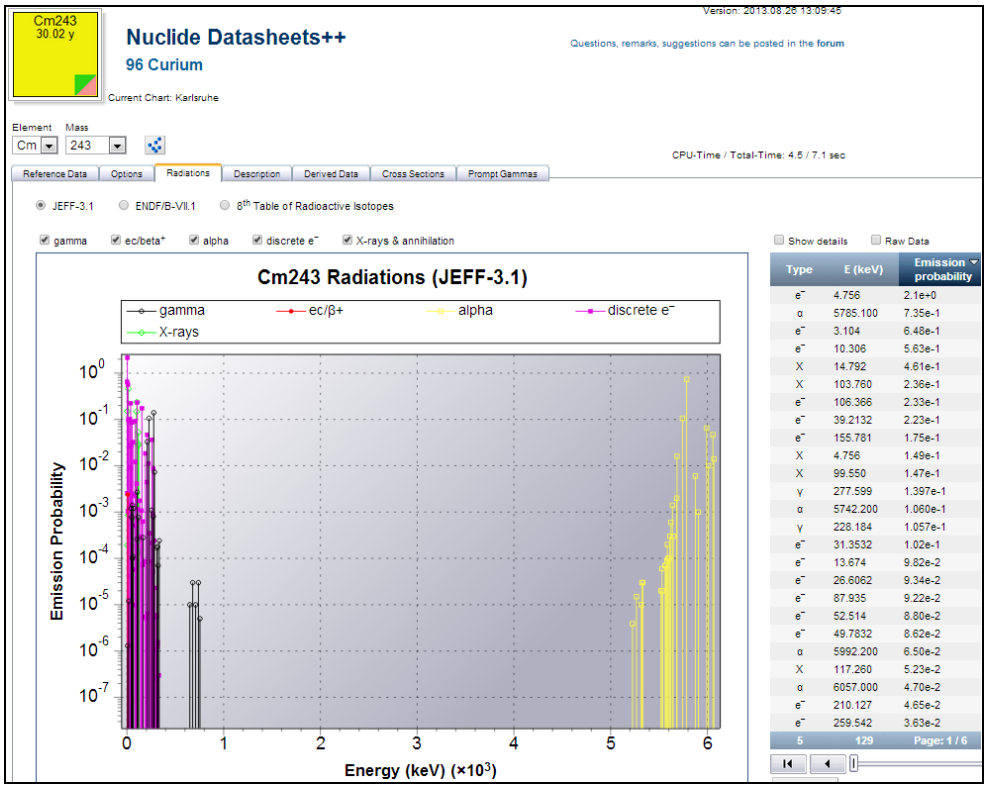
A 66-page colour brochure describing all the applications and features in Nucleonica is available. The pdf can be downloaded from our website

What's New in Nucleonica?

1. Nuclide Datasheets++:

The Radiations tab in the Nuclide Datasheets has been completely redesigned based on the newly developed graphics. All radiations (alpha, beta, gamma, etc.) from a particular radio-nuclide can now be seen in a single graph and table. The data in the graph is colour coded based on the type of radiation. Through the use of check-boxes, the user can select the type of radiation to be shown in the graph. The data in the table can be rearranged in ascending / descending order based on the radiation type, the energy of the emitted radiation, the emission probability, etc.

This new application allows data from different databases to be compared easily through the use of radio buttons.



Nuclide Datasheets++ showing the Radiations tab

The new Datasheets++ has been tested successfully with Firefox, Chrome, and Safari browsers. It runs also on the Internet Explorer (IE) but only on version 9 and above (it does not run on IE8 – no support for SVG). For a limited period of time, the previous version of the Datasheets will continue to be available.

2. ENDF/B-VII.1 decay data now available in Nucleonica

The ENDF/B-VII.1 library, released December 22, 2011 from the Brookhaven National Nuclear Data Centre, is the latest recommended evaluated nuclear data file for use in nuclear science and technology applications. The data library incorporates advances made in the release of ENDF/B-VII.0, including: many new evaluations in the neutron sub-library (423 in all) and over 190 of these contain covariances, new fission product yields and a greatly expanded decay data sub-library.

More information on the Nuclide Datasheets++

$^{152}_{63}Eu_{89}$ ◉ gamma ○ beta$^-$ ○ ec/beta$^+$ ○ discrete e$^-$ ○ X-rays & annihilation

Type	Energy(keV) JEFF-3.1	Energy(keV) ENDF/B-VII.1	Emission Probability JEFF-3.1	Emission Probability ENDF/B-VII.1
γ	121.782 (± 0.000)	121.7817 (± 0.0003)	2.841e-1 (± 1.3e-3)	2.867e-1 (± 1.5e-3)
γ	344.279 (± 0.001)	344.2785 (± 0.0012)	2.658e-1 (± 1.2e-3)	2.656e-1 (± 5.1e-3)
γ	1408.010 (± 0.003)	1408.006 (± 0.003)	2.0841e-1 (± 9.0e-4)	2.107e-1 (± 1.0e-3)
γ	964.079 (± 0.018)	964.079 (± 0.018)	1.4490e-1 (± 6.0e-4)	1.4649e-1 (± 7.2e-4)
γ	1112.080 (± 0.003)	1112.069 (± 0.003)	1.3400e-1 (± 6.0e-4)	1.3685e-1 (± 6.8e-4)
γ	778.905 (± 0.002)	778.904 (± 0.002)	1.2959e-1 (± 6.0e-4)	1.296e-1 (± 1.4e-3)
γ	1085.840 (± 0.010)	1085.869 (± 0.024)	1.0130e-1 (± 6.0e-4)	1.0238e-1 (± 5.3e-4)
γ	244.697 (± 0.001)	244.6975 (± 0.0008)	7.550e-2 (± 4.0e-4)	7.607e-2 (± 4.0e-4)
γ	867.380 (± 0.003)	867.373 (± 0.003)	4.241e-2 (± 2.3e-4)	4.258e-2 (± 2.7e-4)
γ	443.965 (± 0.003)	443.965 (± 0.003)	2.800e-2 (± 2.0e-4)	3.158e-2 (± 3.0e-4)
γ	411.117 (± 0.001)	411.1163 (± 0.0011)	2.2369e-2 (± 1.0e-4)	2.237e-2 (± 2.5e-4)
γ	1089.740 (± 0.005)	1089.737 (± 0.005)	1.7299e-2 (± 1.0e-4)	1.730e-2 (± 2.0e-4)
γ	1299.140 (± 0.008)	1299.140 (± 0.009)	1.6319e-2 (± 9.0e-5)	1.625e-2 (± 1.9e-4)
γ	1212.950 (± 0.011)	1212.948 (± 0.011)	1.4150e-2 (± 9.0e-5)	1.4263e-2 (± 9.3e-5)
γ	367.789 (± 0.002)	367.7887 (± 0.0016)	8.619e-3 (± 5.0e-5)	8.62e-3 (± 1.0e-4)
γ	688.670 (± 0.005)	688.670 (± 0.005)	8.410e-3 (± 6.0e-5)	8.592e-3 (± 9.0e-5)
γ	1005.270 (± 0.017)	1005.272 (± 0.017)	6.65e-3 (± 2.3e-4)	6.476e-3 (± 5.5e-5)
γ	1457.640 (± 0.011)	1457.643 (± 0.011)	4.980e-3 (± 4.0e-5)	5.034e-3 (± 5.1e-5)
γ	678.623 (± 0.005)	563.990 (± 0.007)	4.700e-3 (± 4.0e-5)	4.908e-3 (± 6.6e-5)
γ	586.265 (± 0.003)	678.623 (± 0.005)	4.620e-3 (± 4.0e-5)	4.719e-3 (± 6.6e-5)
γ	563.990 (± 0.007)	586.2648 (± 0.0025)	4.57e-3 (± 1.3e-4)	4.600e-3 (± 7.3e-5)
γ	295.939 (± 0.002)	295.9392 (± 0.0017)	4.420e-3 (± 3.0e-5)	4.481e-3 (± 5.5e-5)
γ	919.337 (± 0.004)	919.330 (± 0.003)	4.290e-3 (± 5.0e-5)	4.280e-3 (± 6.2e-5)
γ	488.679 (± 0.002)	488.6792 (± 0.0020)	4.137e-3 (± 2.4e-5)	4.202e-3 (± 3.8e-5)
γ	443.965 (± 0.003)	719.349 (± 0.004)	3.20e-3 (± 2.0e-4)	3.38e-3 (± 1.1e-4)
Total:	115	109		Page: 1 / 5

The ENDF/B-VII.1 decay data sub-library is now available in Nucleonica in addition to the previously used decay data library JEFF3.1. It is now possible to compare and contrast the main European (JEFF3.1) and American (ENDF/BVII.1) data libraries for differences in half-lives, branching ratios, energies and emission probabilities of the emitted radiations, etc. using Nucleonica's user friendly tools. This data comparison can be accessed through the Options tab of the Nuclide Datasheets++ application.

3. New Decay Engine++

More information on the Decay Engine++

We are currently upgrading the Nucleonica applications to improve user-friendliness and calculation / response times. This means fewer calls to the webserver and more emphasis on local client side computing. The first module incorporating these new features is the Decay Engine++. The name has been changed to Decay Engine++ to distinguish it from the previous version (which we continue to support). The main improvements are summarised as follows:

- A new highly efficient algorithm is used in the Decay Engine++. Details of the algorithm have recently been published (see information in margin).

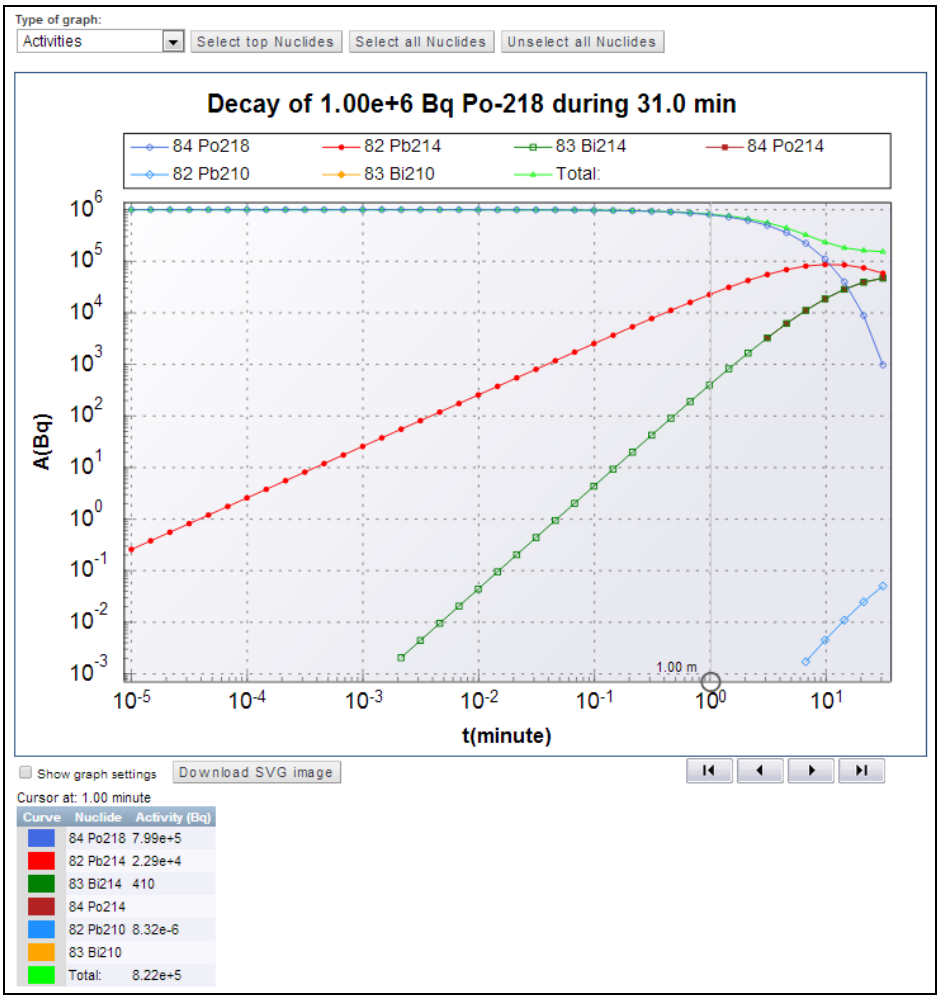
R. Dreher, Modified Bateman solution for identical eigen-values, Annals of Nuclear Energy, 53, 427-438, 2013

- The data output in newly designed grids and tables. This implies that once a decay calculation has been made on the server, the results in the data grids and tables can be re-arranged locally on the client computer. This avoids the time-consuming calls to the web server.
- A completely new graphics package has been developed (previously the images were created on the server and then transferred to the client browser). A logarithmic time axis is now included.
- The Options tab has been further developed for selecting the mode of operation and the quantities to be shown in the output data-grid. The Options are now colour coded according to the type of data (general

quantities, handling, disintegrations) for ease of selection of the appropriate quantities.

- A new "Tree" tab has been developed which shows a decay tree of the decay processes (number of nodes, nuclides, and linear chains, etc.).

- The output activities can now be normalised to the parent or any of the daughters. This is of interest, for example, in nuclear forensics where the "age" of a material depends on these dimensionless ratios.



Decay Engine++ graphical output with crosshair cursor

- The graphical output now contains a crosshair cursor and table. This cursor can be moved using the mouse and leads to an easier reading of the values on the curves. For any given time value, the crosshair table below the graph lists the exact values for all nuclides shown on the graph.

- The integrated gamma dose is now available in decay calculations. The integrated gamma dose is of interest in the field of nuclear medicine. The gamma dose rate and the gamma dose are both activated in the Options tab. Thereafter the results are available in the output grid and in the graph.

- Although the Decay Engine++ cannot accept negative decay times directly, it is straightforward to investigate negative decay times of parent nuclides using the rescale feature. See blog post on this http://www.nucleonica.com/blog/?p=3340

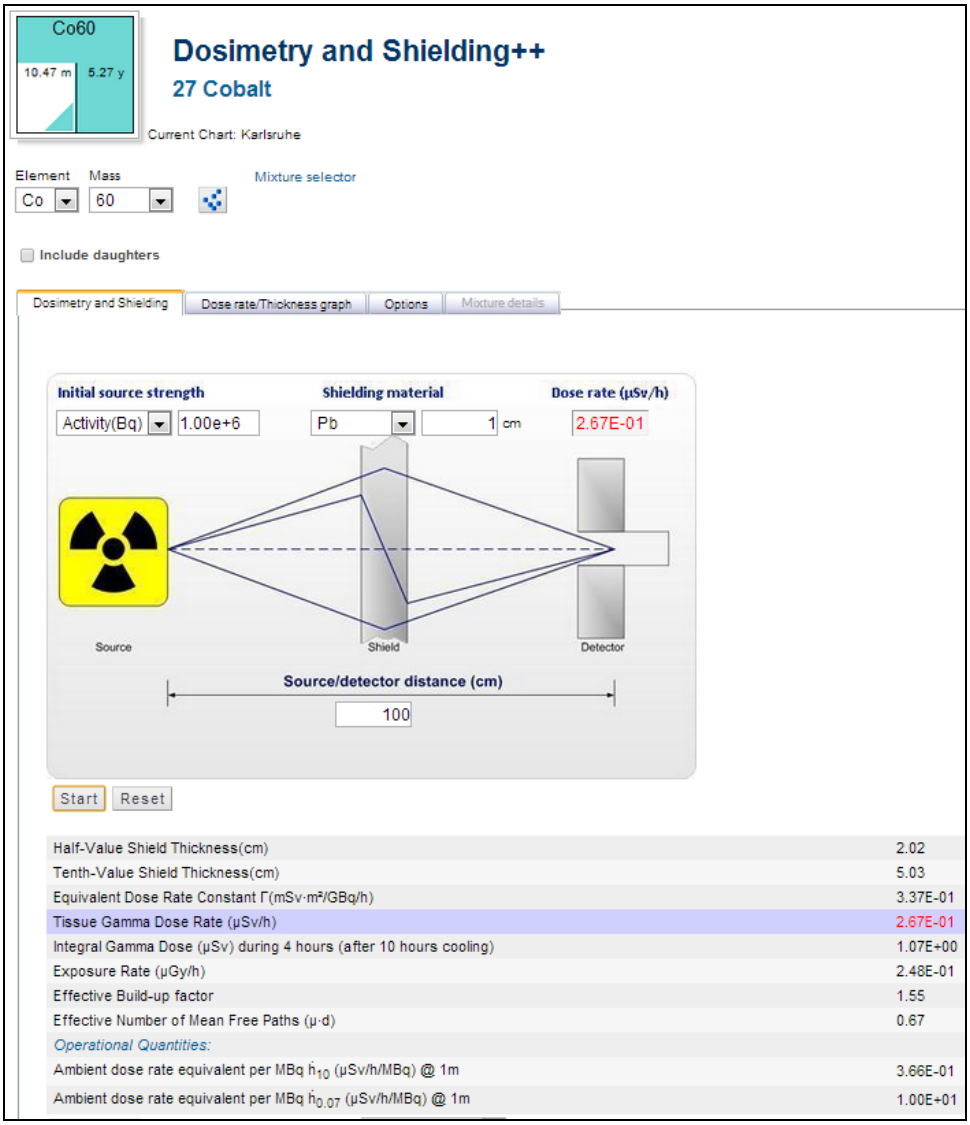
- The Decay Engine++ has been tested successfully with Firefox, Chrome, IE (9), and Safari browsers.

4. New Dosimetry and Shielding++

In August 2013 the release of the new Dosimetry & Shielding++ application was announced. The main improvement are summarised as follows:

- The integrated gamma dose is now available. Previously, only the gamma dose rate was calculated.
- The data output in improved grids and tables. This implies that once a dosimetry & shielding calculation has been made on the server, the results in the data grids and tables can be re-arranged locally on the client computer. This avoids the time-consuming calls to the web server.
- A new graphics package for plotting results
- A new slider control has been introduced for easier identification of gamma energies and nuclides in the spectral graph.
- The Dosimetry & Shielding++ application has been tested successfully with Firefox, Chrome, IE(9) and Safari browsers.

More information on the Dosimetry and Shielding++



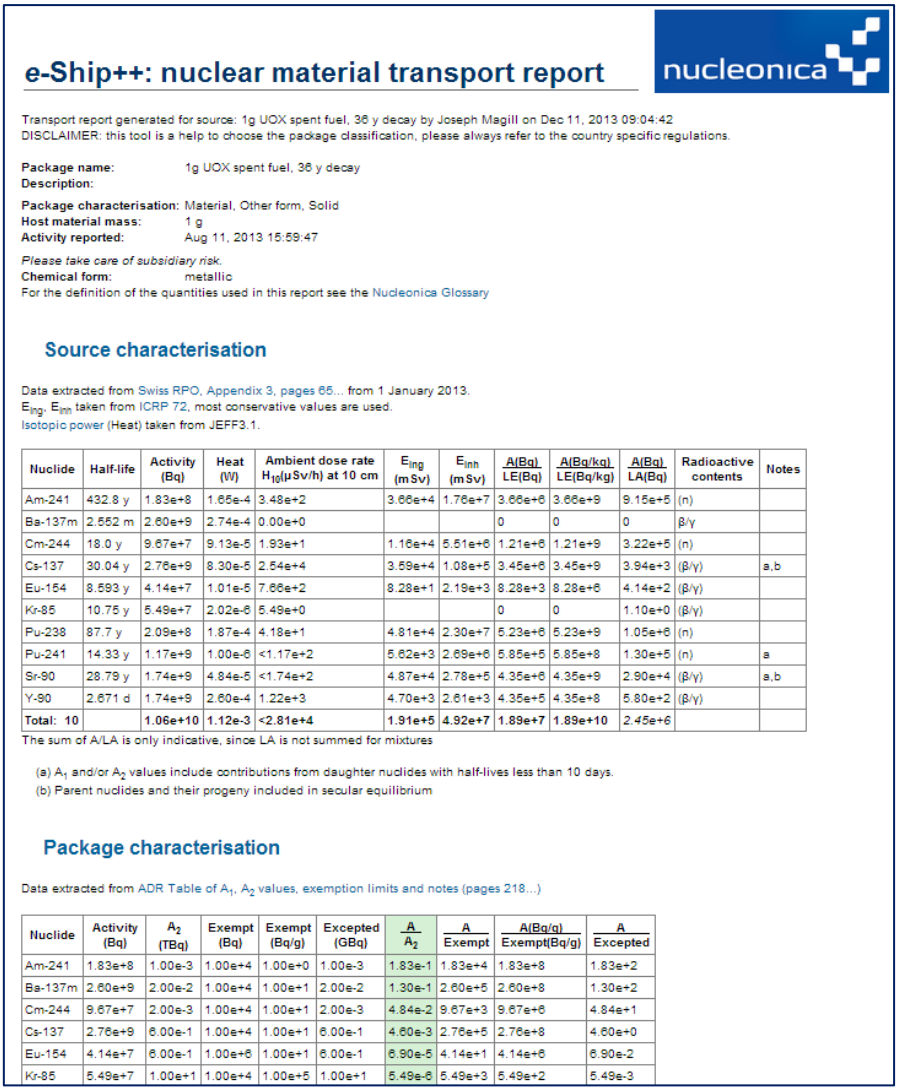
Dosimetry & Shielding++ user interface

5. New *e*-Ship++ transport assistant

In this new release of the *e*-Ship++ application, the following improvements have been made:

- In the package description, a new field "Radioactive contents" has been introduced. This field gives information on the activity limits for so-called "unknown nuclides". The emitter type of each nuclide is determined and indicated in the e-Ship data grid as well as in the report e.g. β/γ.
- In the package description, a new field "Notes" has been introduced, corresponding to the Notes in the ADR and IAEA reports for nuclides.
- In the package description, the field "Chemical form (please take care of subsidiary risk)" has been added. The (mandatory) field forces the user to consider the possibility of subsidiary risk associated with the chemical form of the material.
- In the nuclear material transport report, additional information is listed in the source characterisation such as Exemption limit (LE), Licensing limit (LA), and the related dose coefficients, etc., together with the Radioactive contents and Notes described above.
- In package decay calculations, the rules for including daughter products according to the ADR, IAEA reports (e.g. secular equilibrium has been assumed or daughter products with half-lives less than 10 days) have been taken into account in the activity limits.

More information on
e-Ship++ transport assistant



e-Ship++: nuclear material transport report

nucleonica

Transport report generated for source: 1g UOX spent fuel, 36 y decay by Joseph Magill on Dec 11, 2013 09:04:42
DISCLAIMER: this tool is a help to choose the package classification, please always refer to the country specific regulations.

Package name: 1g UOX spent fuel, 36 y decay
Description:

Package characterisation: Material, Other form, Solid
Host material mass: 1 g
Activity reported: Aug 11, 2013 15:59:47

Please take care of subsidiary risk.
Chemical form: metallic
For the definition of the quantities used in this report see the Nucleonica Glossary

Source characterisation

Data extracted from Swiss RPO, Appendix 3, pages 65... from 1 January 2013.
E_{ing}, E_{inh} taken from ICRP 72, most conservative values are used.
Isotopic power (Heat) taken from JEFF3.1.

Nuclide	Half-life	Activity (Bq)	Heat (W)	Ambient dose rate H_{10}(μSv/h) at 10 cm	E_{ing} (mSv)	E_{inh} (mSv)	A(Bq) / LE(Bq)	A(Bq/kg) / LE(Bq/kg)	A(Bq) / LA(Bq)	Radioactive contents	Notes
Am-241	432.8 y	1.83e+8	1.65e-4	3.48e+2	3.66e+4	1.76e+7	3.66e+6	3.66e+9	9.15e+5	(n)	
Ba-137m	2.552 m	2.60e+9	2.74e-4	0.00e+0			0	0	0	β/γ	
Cm-244	18.0 y	9.67e+7	9.13e-5	1.93e+1	1.16e+4	5.51e+6	1.21e+6	1.21e+9	3.22e+5	(n)	
Cs-137	30.04 y	2.76e+9	8.30e-5	2.54e+4	3.59e+4	1.08e+5	3.45e+6	3.45e+9	3.94e+3	(β/γ)	a,b
Eu-154	8.593 y	4.14e+7	1.01e-5	7.66e+2	8.28e+1	2.19e+3	8.28e+3	8.28e+6	4.14e+2	(β/γ)	
Kr-85	10.75 y	5.49e+7	2.02e-6	5.49e+0			0	0	1.10e+0	(β/γ)	
Pu-238	87.7 y	2.09e+8	1.87e-4	4.18e+1	4.81e+4	2.30e+7	5.23e+6	5.23e+9	1.05e+6	(n)	
Pu-241	14.33 y	1.17e+9	1.00e-6	<1.17e+2	5.62e+3	2.69e+6	5.85e+5	5.85e+8	1.30e+5	(n)	a
Sr-90	28.79 y	1.74e+9	4.84e-5	<1.74e+2	4.87e+4	2.78e+5	4.35e+6	4.35e+9	2.90e+4	(β/γ)	a,b
Y-90	2.671 d	1.74e+9	2.60e-4	1.22e+3	4.70e+3	2.61e+3	4.35e+5	4.35e+8	5.80e+2	(β/γ)	
Total: 10		**1.06e+10**	**1.12e-3**	**<2.81e+4**	**1.91e+5**	**4.92e+7**	**1.89e+7**	**1.89e+10**	*2.45e+6*		

The sum of A/LA is only indicative, since LA is not summed for mixtures

(a) A_1 and/or A_2 values include contributions from daughter nuclides with half-lives less than 10 days.
(b) Parent nuclides and their progeny included in secular equilibrium

Package characterisation

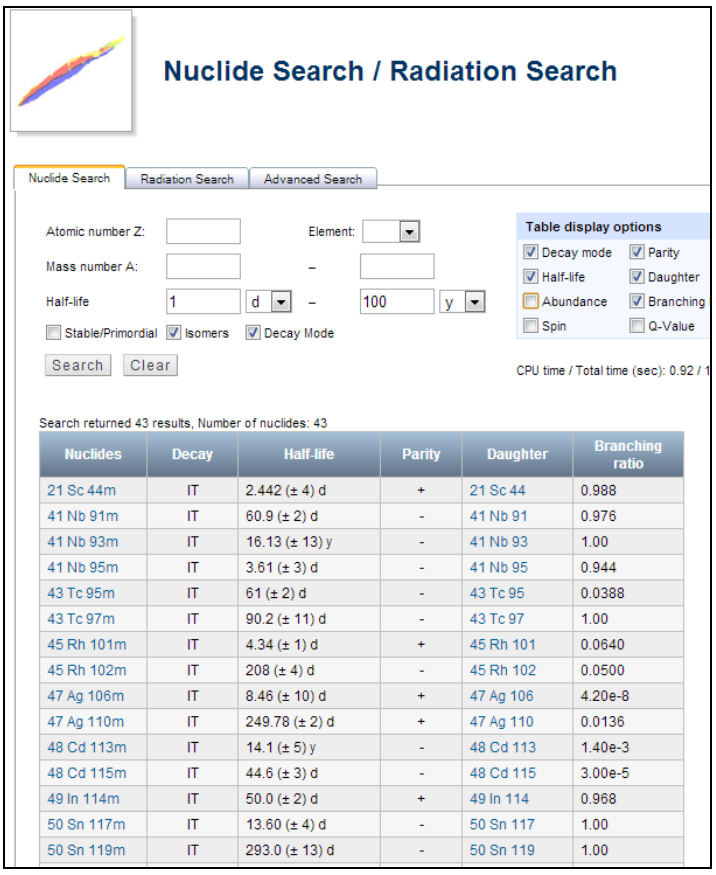
Data extracted from ADR Table of A_1, A_2 values, exemption limits and notes (pages 218...)

Nuclide	Activity (Bq)	A_2 (TBq)	Exempt (Bq)	Exempt (Bq/g)	Excepted (GBq)	A / A_2	A / Exempt	A(Bq/g) / Exempt(Bq/g)	A / Excepted
Am-241	1.83e+8	1.00e-3	1.00e+4	1.00e+0	1.00e-3	1.83e-1	1.83e+4	1.83e+8	1.83e+2
Ba-137m	2.60e+9	2.00e-2	1.00e+4	1.00e+1	2.00e-2	1.30e-1	2.60e+5	2.60e+8	1.30e+2
Cm-244	9.67e+7	2.00e-3	1.00e+4	1.00e+1	2.00e-3	4.84e-2	9.67e+3	9.67e+6	4.84e+1
Cs-137	2.76e+9	6.00e-1	1.00e+4	1.00e+1	6.00e-1	4.60e-3	2.76e+5	2.76e+8	4.60e+0
Eu-154	4.14e+7	6.00e-1	1.00e+6	1.00e+1	6.00e-1	6.90e-5	4.14e+1	4.14e+6	6.90e-2
Kr-85	5.49e+7	1.00e+1	1.00e+4	1.00e+5	1.00e+1	5.49e-6	5.49e+3	5.49e+2	5.49e-3

e-Ship++ nuclear transport report

6. Upgraded Nuclide Search / Radiation Search

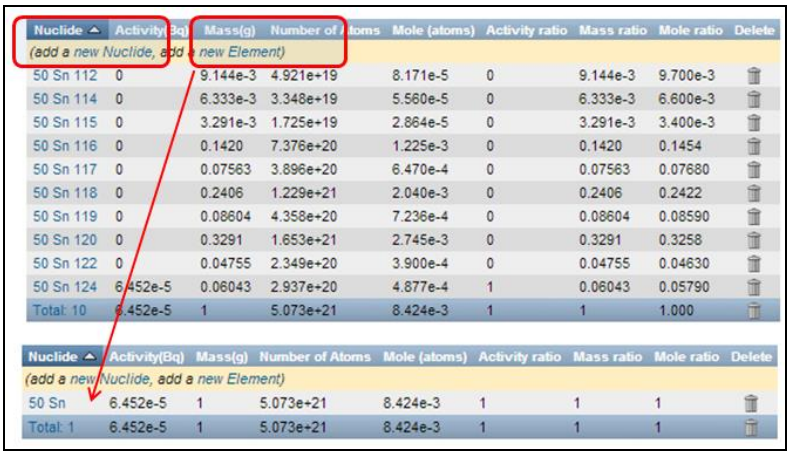
In order to streamline the Nucleonica Data applications a number of changes have been made. The Nuclear Data Retrieval has been renamed to Nuclide Search / Radiation Search. The Nuclide Search / Radiation Search application has been rewritten. The new user interface has been designed for improved performance and faster searching. Data in the table can be arranged in ascending / descending order locally on the client browser. Table display options can now be activated / deactivated directly without a server call.



Nuclides	Decay	Half-life	Parity	Daughter	Branching ratio
21 Sc 44m	IT	2.442 (± 4) d	+	21 Sc 44	0.988
41 Nb 91m	IT	60.9 (± 2) d	-	41 Nb 91	0.976
41 Nb 93m	IT	16.13 (± 13) y	-	41 Nb 93	1.00
41 Nb 95m	IT	3.61 (± 3) d	-	41 Nb 95	0.944
43 Tc 95m	IT	61 (± 2) d	-	43 Tc 95	0.0388
43 Tc 97m	IT	90.2 (± 11) d	-	43 Tc 97	1.00
45 Rh 101m	IT	4.34 (± 1) d	+	45 Rh 101	0.0640
45 Rh 102m	IT	208 (± 4) d	-	45 Rh 102	0.0500
47 Ag 106m	IT	8.46 (± 10) d	+	47 Ag 106	4.20e-8
47 Ag 110m	IT	249.78 (± 2) d	+	47 Ag 110	0.0136
48 Cd 113m	IT	14.1 (± 5) y	-	48 Cd 113	1.40e-3
48 Cd 115m	IT	44.6 (± 3) d	-	48 Cd 115	3.00e-5
49 In 114m	IT	50.0 (± 2) d	+	49 In 114	0.968
50 Sn 117m	IT	13.60 (± 4) d	-	50 Sn 117	1.00
50 Sn 119m	IT	293.0 (± 13) d	-	50 Sn 119	1.00

7. Nuclide Mixtures now with Chemical Elements

The Nuclide Mixture application in Nucleonica allows the user to create nuclide mixtures which can be used in other Nucleonica applications (e.g. Mass Activity Converter, Decay Engine++, Dosimetry&Shielding++, Gamma Spectrum Generator, webKORIGEN, *e*-Ship++,…). To create a nuclide mixture, the nuclides are selected from drop-down menus and added to the newly defined mixture.



Nuclide	Activity(Bq)	Mass(g)	Number of Atoms	Mole (atoms)	Activity ratio	Mass ratio	Mole ratio	Delete
(add a new Nuclide, add a new Element)								
50 Sn 112	0	9.144e-3	4.921e+19	8.171e-5	0	9.144e-3	9.700e-3	
50 Sn 114	0	6.333e-3	3.348e+19	5.560e-5	0	6.333e-3	6.600e-3	
50 Sn 115	0	3.291e-3	1.725e+19	2.864e-5	0	3.291e-3	3.400e-3	
50 Sn 116	0	0.1420	7.376e+20	1.225e-3	0	0.1420	0.1454	
50 Sn 117	0	0.07563	3.896e+20	6.470e-4	0	0.07563	0.07680	
50 Sn 118	0	0.2406	1.229e+21	2.040e-3	0	0.2406	0.2422	
50 Sn 119	0	0.08604	4.358e+20	7.236e-4	0	0.08604	0.08590	
50 Sn 120	0	0.3291	1.653e+21	2.745e-3	0	0.3291	0.3258	
50 Sn 122	0	0.04755	2.349e+20	3.900e-4	0	0.04755	0.04630	
50 Sn 124	6.452e-5	0.06043	2.937e+20	4.877e-4	1	0.06043	0.05790	
Total: 10	6.452e-5	1	5.073e+21	8.424e-3	1	1	1.000	

Nuclide	Activity(Bq)	Mass(g)	Number of Atoms	Mole (atoms)	Activity ratio	Mass ratio	Mole ratio	Delete
(add a new Nuclide, add a new Element)								
50 Sn	6.452e-5	1	5.073e+21	8.424e-3	1	1	1	
Total: 1	6.452e-5	1	5.073e+21	8.424e-3	1	1	1	

More information on Nuclide Search / Radiation Search

More information on
Nuclide Mixtures

- In this update of the application, chemical elements (with a range of stable isotopes) can now be added in a single operation. Previously, a mixture of natural uranium would require adding separately the three isotopes U-234, U-235, and U-238. This can now be done with a single operation i.e. by adding the element U (with isotope concentrations given by the natural abundances). The newly created mixture can then be viewed in the nuclide or element modes to see the list of nuclides or elements respectively.

- It is also now possible to send Nuclide Mixture(s) directly to a colleague. The traditional way of doing this was to download an already existing mixture to your PC and then send this mixture as an email attachment to your colleague. A more elegant method is to use the recently developed *Send to my contacts* feature in the Nuclide Mixtures. Tick the check boxes for the mixture(s) to be sent. In the Send to my contacts, select the contact from the drop-down list (assume contact already exists in My Contacts).

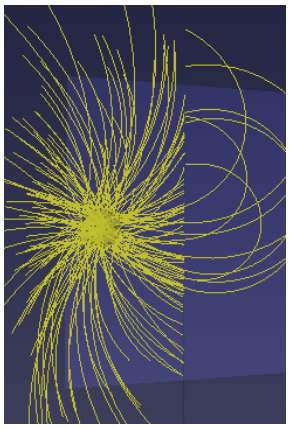
- Datafiles can now be directly imported into the Nuclide Mixtures application. Users can now upload/import csv-files directly into the Nuclides Mixtures application. Following a request by Fz-Juelich users, the Nuclide Mixtures application has been extended to allow importing/uploading csv-files, for example created from spreadsheets, computer codes, experiments, etc. Previously only xml files created by the application could be imported.

8. More application upgrades…

A number of additional improvements and updates to the Nucleonica applications include:

Virtual Cloud Chamber: it is now possible to simulate alpha particles and protons in addition to photons, electron, and positrons. In the example shown, 5 MeV alpha particles are mostly stopped by a thin layer (40 µm) of tissue. A magnetic field is used to show the alpha particle trajectories more clearly.

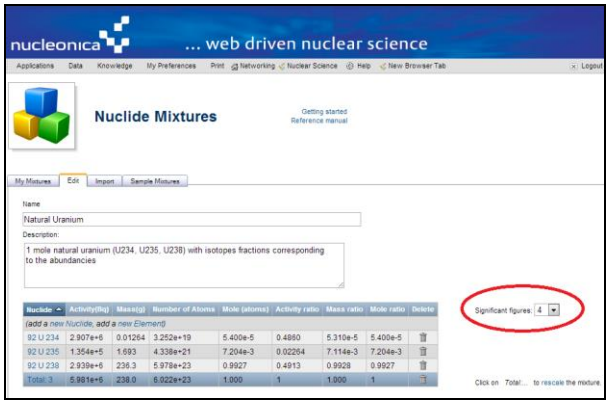
More information on the Virtual Cloud Chamber



Stopping of alpha particles in a thin layer (30 µm) of tissue

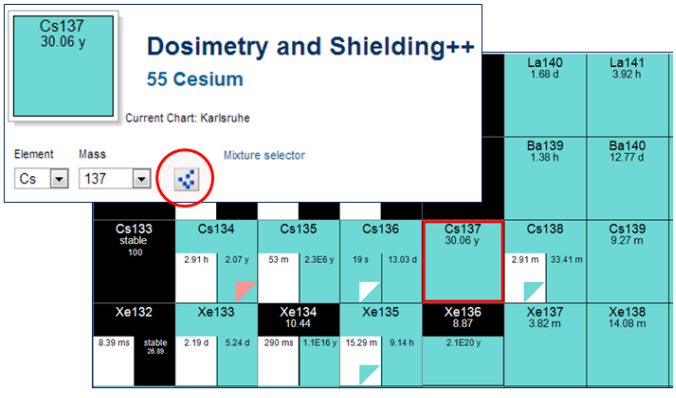
Mass Activity Converter (MAC): the user can now change the number of significant figures in the output grid.

More information on the Mass Activity Convertor



Nuclide Explorer: From within an application, the user can see the selected nuclide in the Nuclide Explorer by clicking on the Nucleonica icon. In the example below, the Dosimetry and Shielding (D&S) application shows the nuclide Co60. By clicking on the Nucleonica icon, the location of Co60 in the Nuclide Explorer (NE) is shown in a new tab. The user can then switch between the D&S tab and the NE tab.

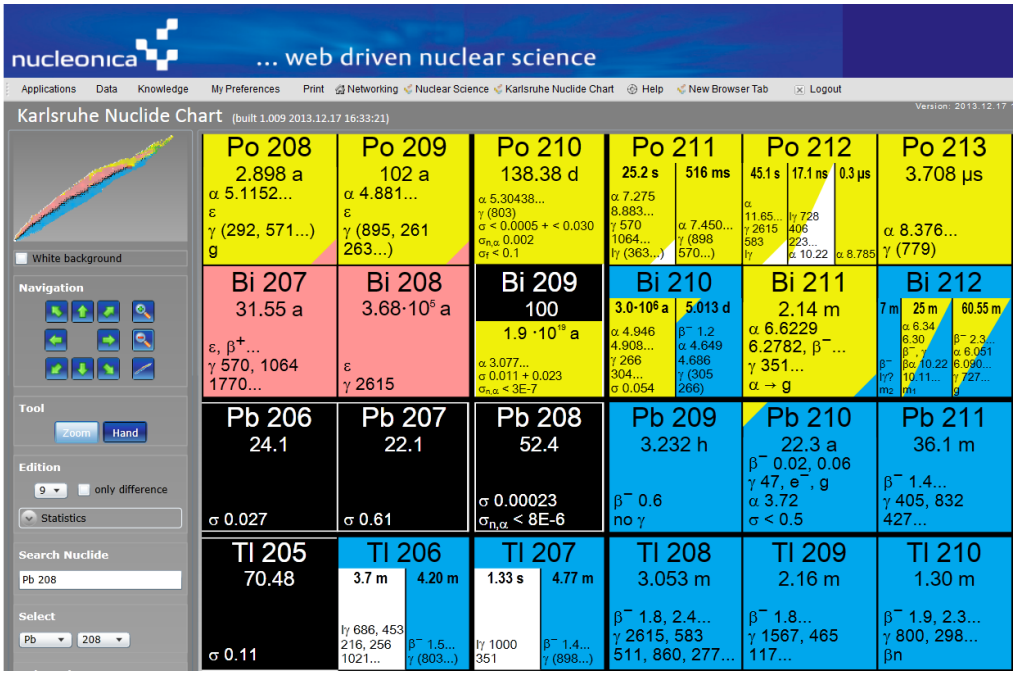
More information on the Nuclide Explorer



Karlsruhe Nuclide Chart

New Karlsruhe Nuclide Chart Online (KNCO)

It is with great pleasure that we announce the release on a new product - the Karlsruhe Nuclide Chart Online. For over 55 years, the Chart has been available only in print versions. This new release of the online version is a major landmark in the evolution of the Chart.



The main features on the new online version of the Chart are:

- Fully featured electronic version of the Karlsruhe Nuclide Chart, giving the latest experimental data for ground states and isomers
- Karlsruhe Nuclide Chart Online updated as soon as new data become available to provide the latest up to date nuclear data.
- Fast search and navigation through > 4000 ground states and isomers
- Access to earlier editions (8th Edition 2012, 7th Edition 2006);
- Access to the "difference" Charts, which show the difference between editions (e.g. the differences between the 2012 and 2006 editions)
- Colour schemes based on modes of decay and half-lives
- New "App" dashboard interface provides access to the Karlsruhe Nuclide Chart Online and supporting applications (What the colours mean, Modes of radioactive decay, How to use the KNCO, Physical Constants and Conversion Factors, Decay schemes for selected nuclides, Fission Isomers, Property of the Elements, Periodic Table, etc.)
- Decay schemes for selected nuclides to assist in the interpretation of the nuclide data in the Chart
- Dedicated Karlsruhe Nuclide Chart glossary; additional support with Wiki, Blog, Forum

For more information see Karlsruhe Nuclide Chart Online (KNCO)

Order Details:

The Karlsruhe Nuclide Chart Online (KNCO) is accessible through the Nucleonica portal

http://www.nucleonica.com.

Access to the KNCO can be ordered through our

Online Order Form

or from

info@nucleonica.com

Technical Requirements:

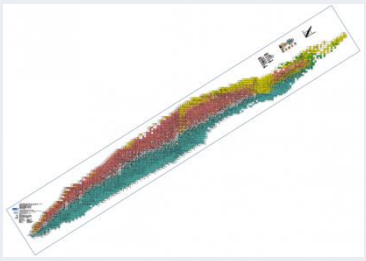
The Karlsruhe Nuclide Chart Online requires the Silverlight plugin to be installed on the user computer. The application will run on Silverlight compatible operating systems and browsers (Chrome, Firefox, Internet Explorer, Safari).

Print versions of the Karlsruhe Nuclide Chart…

Download the flyer

The Karlsruhe Nuclide Chart Fold-out Chart (A4)

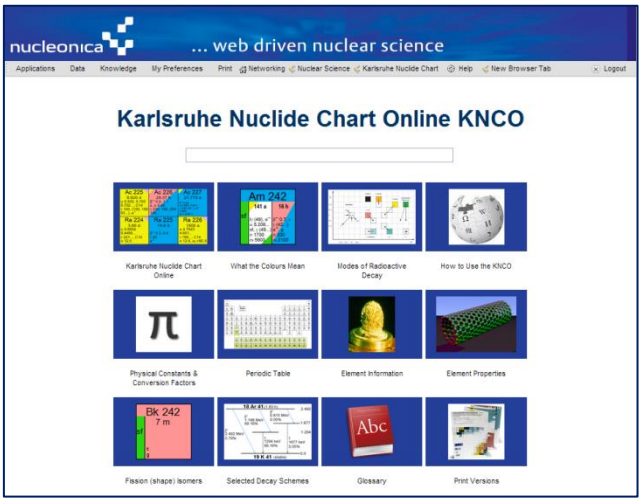
The Roll Map (170x120cm).



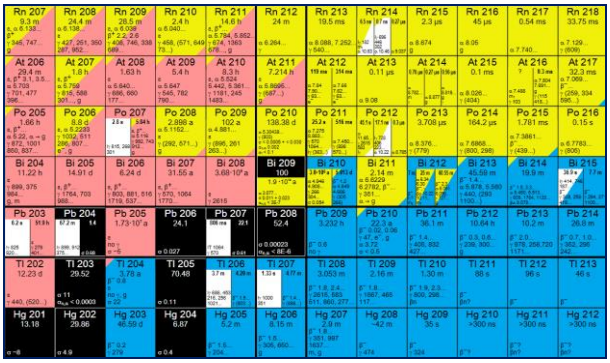
The Auditorium Chart, 43 cm x 316 cm.

The Karlsruhe Nuclide "Carpet" (approximate dimensions 100 cm x 650 m).

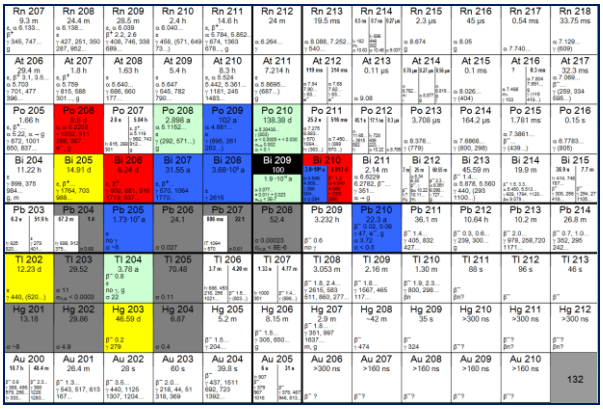
New Karlsruhe Nuclide Chart Online (KNCO) cont'd…



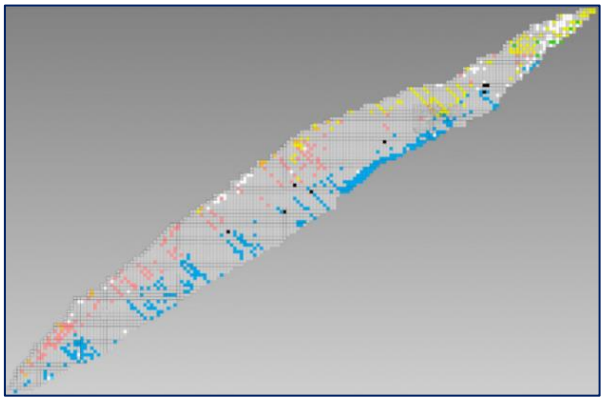
New "App" interface provides access to the Karlsruhe Nuclide Chart Online KNCO and supporting applications



KNCO: Colours based on decay modes



KNCO: Colours based on half-lives



KNCO: Difference Charts

Exhibitions / Conferences / Meetings 2013

15th Technical discussion for monitoring environmental radioactivity

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and the University of Bremen jointly organized, from the 5-7 March 2013, the 15th Discussion "of environmental radioactivity monitoring" with the "Data – Models – Information". The expert meeting was aimed at sharing experience and information on new developments. There was an invited talk on Nucleonica and a software demonstration at the exhibition.

Nucleonica @ Science Festival EFFEKTE in Karlsruhe, 21-30 June 2013

"A collage of virtual design, films, speeches, dance, performance artistry, scientific presentations and live music made the subject of "Science in Karlsruhe" for the citizens' sensual experience."

This provided the background setting to a major science festival to celebrate the 300th birthday of the City of Karlsruhe in Germany. In collaboration with the JRC's Institute for Transuranium elements, Nucleonica also had its products on display. A major attraction was a very large display of the Karlsruhe Nuclide Chart on Saturday evening (22.06.2013) in the castle grounds.

Training Courses

Nucleonica Training Course, April 2013

This 2-day training course took place at the Center for Advanced Technological and Environmental Training FTU, Karlsruher Institut für Technologie (KIT), during the 18-19 April, 2013. This was an introductory training course which focused mainly on the Nucleonica core applications and tools. A detailed description of nuclear data with particular reference to the various Nucleonica nuclear databases was given. Core applications were demonstrated through the use of Nucleonica tools such as the Decay Engine, Dosimetry and Shielding and the Gamma Spectrum Generator. A course highlight was the presentation by Yann Donjoux from CERN on an overview of the classification of radioactive packages for transport. A detailed description of the new application – the eShip transport assistant jointly developed by CERN and Nucleonica – was given. Of special interest were burnup and depletion calculations for the characterization of legacy waste through the use of the webKORIGEN fuel cycle analyses module.

Next Nucleonica Training Course will take place in Karlsruhe on 10-11 April 2014.

Registration Now Open

Participating in a Nucleonica training course is the most effective way of learning to use Nucleonica.

Are you interested?

Please contact us at: info@nucleonica.com

For more information and registration information see Nucleonica Training Courses

The full training course proceedings are available online

Nucleonica training course at FTU, Karlsruhe

Nucleonica for Newcomers, June 2013

This 1.5-day training course took place at the JRC's Instituite for Reference Materials and Measurements (IRMM) in Geel, Belgium during the 13-14 June 2013. Core applications were demonstrated through the use of Nucleonica tools such as the Decay Engine, and Dosimetry and Shielding. Special emphasis was placed on the Virtual Cloud Chamber application for radiation protection studies and investigating the interaction of charged particles and photons with matter.

Nucleonica courses at School on Decommissioning, July 2013.

Nucleonica was invited to give a series of short "hands-on" training courses at the 5th International Summer School 2013, *Operational Issues in Radioactive Waste Management and Nuclear Decommissioning* from 9-13 September at the JRC's centre in Ispra, Italy.

This year, the course was organized around several technical sessions featuring five visits to JRC-ISPRA's laboratories that are involved in decommissioning and nuclear and radioactive waste management. The Nucleonica training sessions formed one such "laboratory" where participants learned how to use Nucleonica applications effectively in this area.

Nucleonica: Basic, Core and Advanced Applications 6 Tools, Oct. 2013

This 2-day training course took place at the JRC's Institute for Reference Materials and Measurements (IRMM) in Geel, Belgium during the 3-4 October 2013. The course focused mainly on the Nucleonica Basic, Core and Advanced Applications and Tools. Key lectures were given by Dr. Jozsef Zsigrai (ITU) on webKORIGEN, the Gamma Spectrum Generator and Gamma libraries and Mr. Yann Donjoux (CERN) on the e-Ship++ radiological transport assistant applications in Nucleonica.

For further information see Nucleonica Premium Access

Nucleonica training course at IRMM, Belgium

Introduction to Nucleonica: Core Applications and Tools, Oct. 2013.

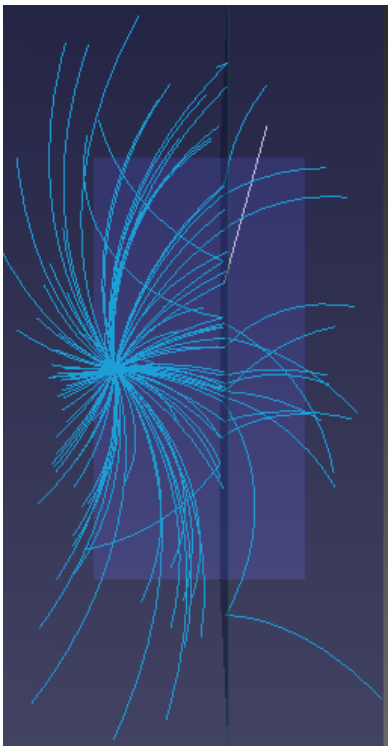
This 1.5-day training course took place at CERN 24-25 October 2013. The course focused mainly on the Nucleonica core applications and tools. Core applications were demonstrated through the use of Nucleonica tools such as the Decay Engine++, and Dosimetry and Shielding++, and Nuclide Mixtures. A key lecture was given by Mr. Yann Donjoux (CERN) on the e-Ship++ radiological transport assistant application in Nucleonica which has been developed jointly by CERN and Nucleonica over the past two years.

Nucleonica training course at CERN, Switzerland

Nucleonica for Newcomers, November 2013

This half-day training course took place at the JRC's Institute for Transuranium Elements, 18 November 2013. A overview was given of the nuclear data with particular reference to the various Nucleonica nuclear databases. Core applications were covered with emphasis on the Decay Engine++, Dosimetry & Shielding++, and the Virtual Cloud Chamber application for radiation protection studies and investigating the interaction of charged particles and photons with matter.

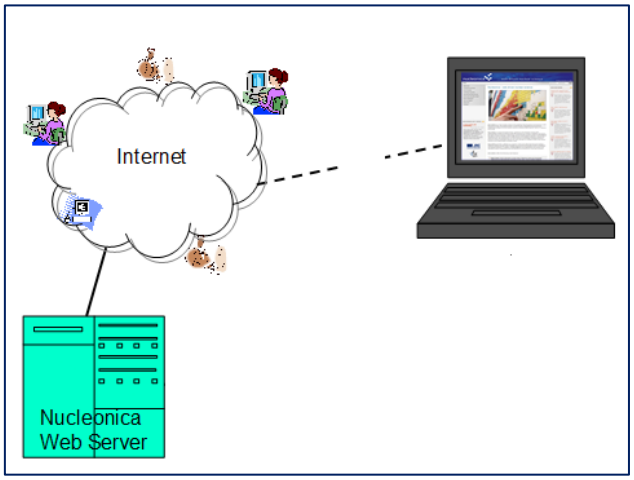
Nucleonica training course in Berlin, Nov. 2013



This 1-day training course took place at the offices of the Federal Office for Radiation Protection (Bundesamt für Strahlenschutz BfS) in Berlin, during the 27-28 November 2013. This was an intermediate level training course which focused mainly on the Nucleonica core applications with emphasis on Case Studies. A detailed description of nuclear data with particular reference to the various Nucleonica nuclear databases was given. Core applications were demonstrated through the use of Nucleonica applications such as the Mass Activity Converter, Nuclide Mixtures, Decay Engine++, and Dosimetry and Shielding++, Gamma Spectrum Generator, Cambio, and WESPA. Two nuclear security related case studies were given on the identification of suspected nuclear and radioactive materials.

New server park for Nucleonica servers

On 22 September 2013, the Nucleonica web servers were moved to a completely new high-performance data centre located in Germany. This new centre works much more energy efficiently and provides high safety standards. These advantages are of direct benefit both to the environment and to our users.



Careers

Nucleonica is a rapidly growing internet portal delivering nuclear data and web-based nuclear science applications to our users worldwide. We are looking for scientific software developers with a physics and informatics background, who would like to grow with us, who share integrity, intellectual curiosity and the desire to work in a collegial atmosphere with like-minded people. Nucleonica offers full and part time jobs.

You should have programming experience in at least one of our core languages: Java, Javascript, C#, C++, C, VB, .NET, or Python.

Internships are available to undergraduate and advanced degree students throughout the year. We are also open for collaborations and meeting potential partners.

If you would like to apply, simply send us your CV and cover letter by email to:

joseph.magill@nucleonica.com

Nucleonica GmbH is a spin-off from the JRC's Institute for Transuranium Elements

Thank you!

Nucleonica GmbH would like to thank everyone who has contributed during 2013. Special thanks go to the Technology Transfer Unit of the JRC in Brussels for assistance during the past year.

Thanks also to Mr. Yann Donjoux from CERN for a very successful collaboration in the implementation of CERN's radiological transport assistant *e*-Ship++ as a web-based application in Nucleonica.

The Nucleonica Team would also like to thank the many organizations which have signed up for Premium use of Nucleonica during 2013 (see our list of our customers) and we look forward to working with you together in 2014.

In 2013 Nucleonica has made donations to SOS Kinderdorf, Médecins Sans Frontières and unicef.

Impressum

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The Nucleonica Newsletter is prepared by Nucleonica GmbH, Hermann-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen, Germany

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