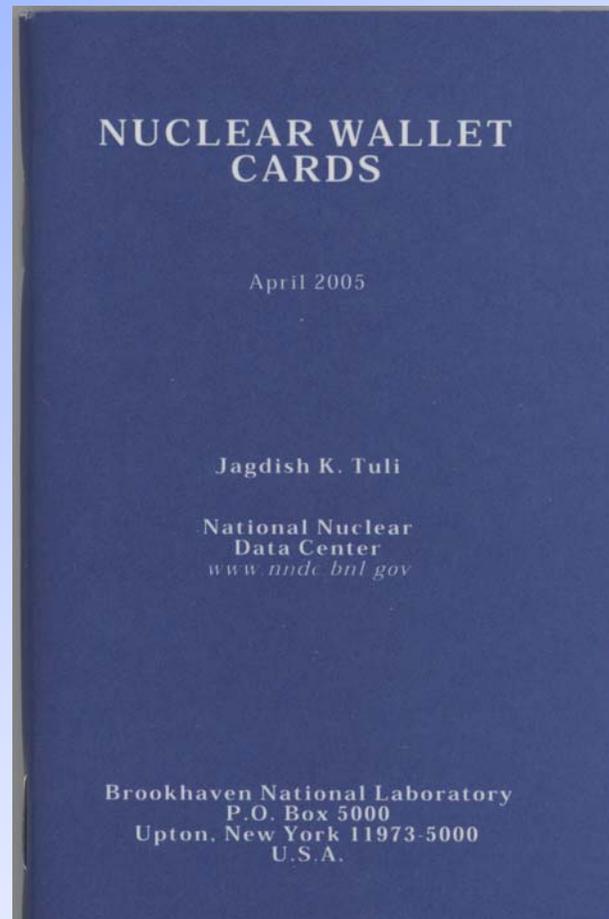
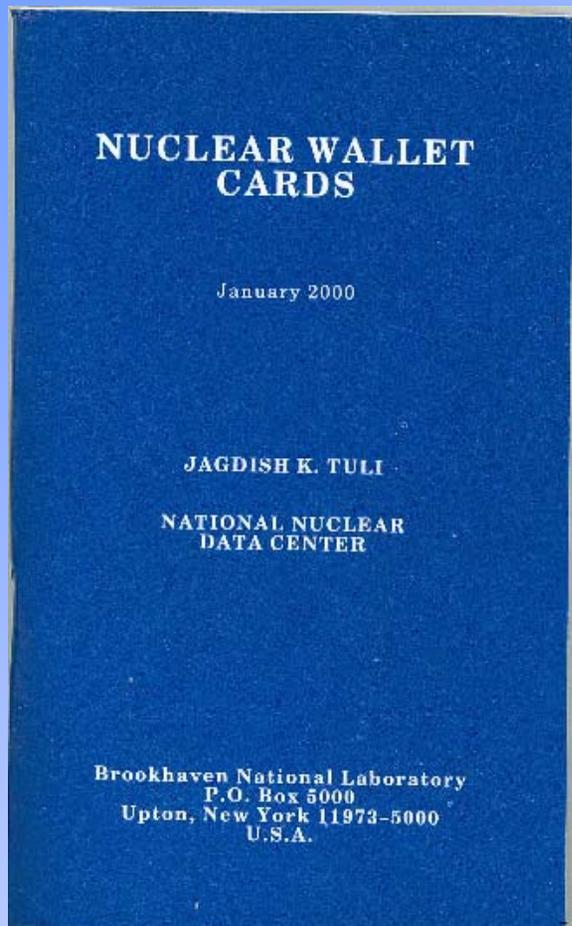


Nuclear Wallet Cards for Homeland Security

J. K. Tuli

National Nuclear Data Center
Brookhaven National Laboratory
Upton, NY 11973

Nuclear Wallet Cards-2000/05



Nuclear Wallet Cards-2000

All 7000 copies of the Sixth (Millennium) Edition have been distributed.

This edition will, however, be maintained by NNDC as this has been adopted as the half-life standard for the US DOE nuclear-material inventory control.

Objective: Homeland Security personnel in the field to identify the source of observed radioactivity

Present the basic properties of various radioactive isotopes likely to be encountered in almost all foreseeable conditions, such as:

- in a smuggled cargo

- a naturally-occurring radioactive source, or in a dirty bomb.

Limit to radioactive nuclides with half-life >1 hour.

The properties presented limited to
Half-life
Principal radiations.

An energy-ordered gamma-ray table showing possible origin of the gamma radiation.

Better-known and naturally occurring radioactive nuclides.

Naturally-occurring decay Chains

**Nuclear Wallet Cards
for Radioactive Nuclides**

March 2004

Jagdish K. Tuli
National Nuclear Data Center
(www.nndc.bnl.gov)

Brookhaven National Laboratory
P.O. Box 5000
Upton, New York 11973-5000
USA

Brookhaven Science Associates
U.S. Department of Energy



NuDat Database

NuDat 2.0

NuDat 2.0 allows to search and plot nuclear structure and nuclear decay data interactively. [More...](#)

Search Options:

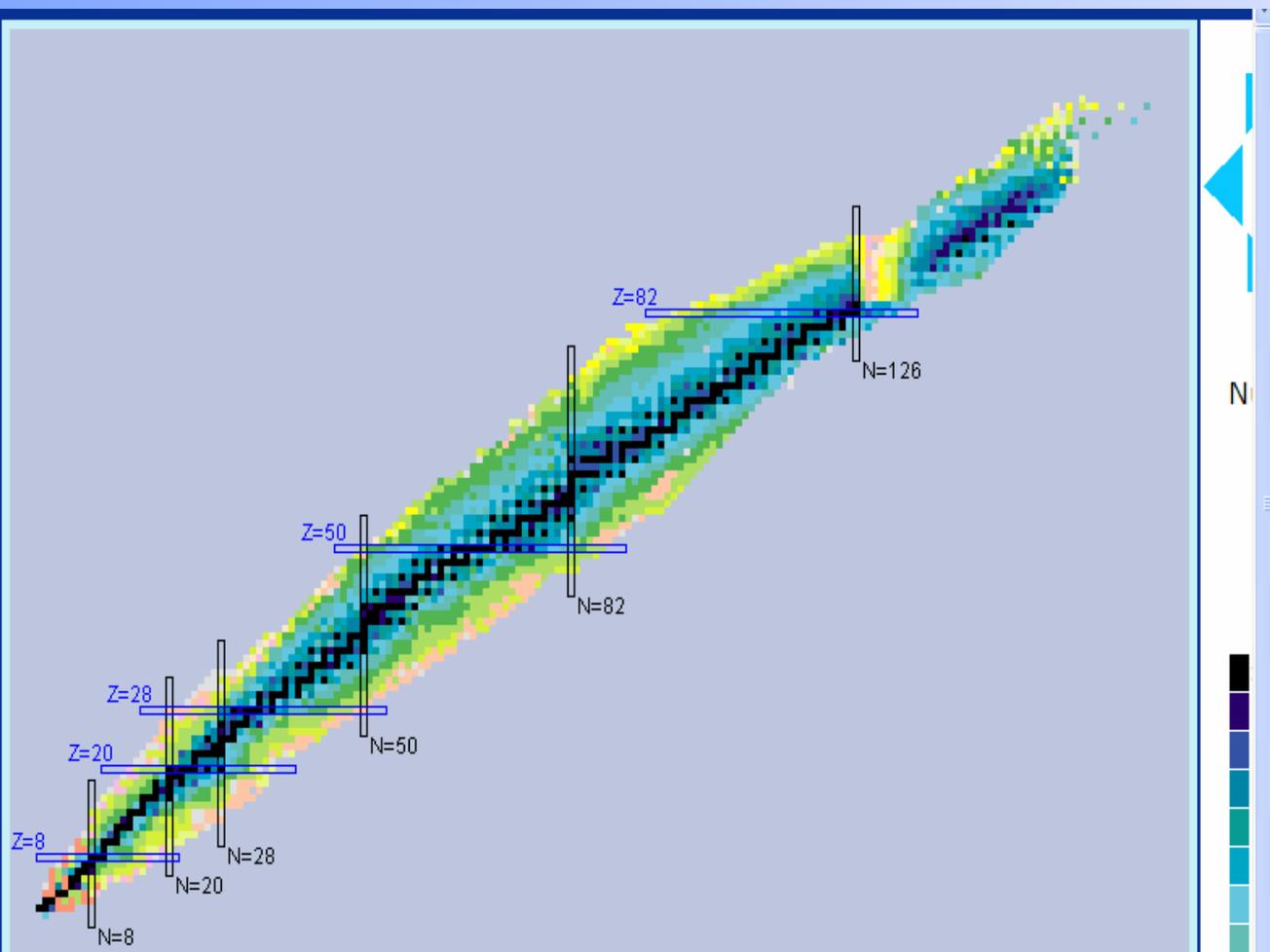
Levels and Gammas

Search on ground and excited states level properties (energy, half-life, spin and parity, decay modes) and gamma-ray information (energy, branching ratio, multipolarity)

Nuclear Wallet Cards

Search on ground and isomeric states level properties, neutron resonance parameters and thermal cross sections

Decay Radiation



Ground and isomeric state information for ^{128}Ba
 A full list of levels and a level scheme are available

Nucleus	E(level) (MeV)	J π	Δ (MeV)	$T_{1/2}$	Abundance	Decay Modes
$^{128}_{56}\text{Ba}$	0.0000	0+	-85.4097	2.43 d	5	ϵ : 100.00 %

Nuclear Wallet Cards



To NNDC

Nuclear Wallet Cards for Radioactive Nuclides (Homeland Security)

This version of Nuclear Wallet Cards contains decay properties only of radioactive nuclides, with $T_{1/2} \geq 1\text{h}$ and $Z \leq 100$. There are two nuclear data tables ordered by isotope and by gamma-ray energy and produced as standard [hardcopy](#) and in PDA-adaptable format. PDA version of Nuclear Wallet Cards ordered by gamma-ray energy and isotope can be found [here](#).

Nuclear Wallet Cards for Radioactive Nuclides

March 2004

Jagdish K. Tuli

National Nuclear Data Center

Brookhaven National Laboratory

P.O. Box 5000

Upton, New York 11973-5000

USA

General
Information

Current Version

Radioactive
Nuclides (Homeland
Security)

Nuclear Materials
Management &
Safeguards

Palm Pilot

Sixth Edition
2000

Last updated by [Boris Pritychenko](#) on April 22, 2004.

Nuclear Wallet Cards



To NNDC

Palm Pilot

PDA version requires Palm OS 3.0 or higher and [mobiledb](#) database program installed. The mobiledb database program can be substituted with a FreewarePalm [mobiledb-lite](#) program. All recent versions of Nuclear Wallet Cards such as [Nuclear Wallet Cards for Radioactive Isotopes](#) and the [sixth edition](#) are available in the PDA format.



Compact "Slider" Design

[General Information](#)

[Current Version](#)

[Radioactive Nuclides \(Homeland Security\)](#)

[Nuclear Materials Management & Safeguards](#)

[Palm Pilot](#)

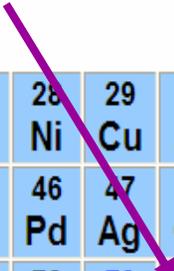
[Sixth Edition 2000](#)

Last updated by [Boris Pritychenko](#) on April 22, 2004.

click on the periodic table below

0	1																	2
n	H																	He
	3	4											5	6	7	8	9	10
	Li	Be											B	C	N	O	F	Ne
	11	12											13	14	15	16	17	18
	Na	Mg											Al	Si	P	S	Cl	Ar
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
	55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
	87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Uuu	Uub	Uut	Uuq	Uup	Uuh	Uus	Uuo
			58	59	60	61	62	63	64	65	66	67	68	69	70	71		
			Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu		
			90	91	92	93	94	95	96	97	98	99	100	101	102	103		
			Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr		

Choose: Hg



General Information

Current Version

Radioactive Nuclides (Homeland Security)

Nuclear Materials Management & Safeguards

Palm Pilot

Sixth Edition 2000

Last updated by Boris Pritychenko on April 21, 2004.

Results for Z=80

Nucleus	E(level) (MeV)	J π	Δ (MeV)	T _{1/2}	Abundance	Decay Modes
¹⁷¹ ₈₀ Hg	0.0000			60 μ s <i>+40-15</i>		$\alpha \approx 100.00\%$
¹⁷² ₈₀ Hg		0+		0.25 ms <i>+35-9</i>		α
¹⁷³ ₈₀ Hg	0.0000			0.9 ms <i>+6-3</i>		$\alpha \approx 100.00\%$
¹⁷⁴ ₈₀ Hg	0.0000	0+		2.1 ms <i>+18-7</i>		$\alpha : 99.60\%$
¹⁷⁵ ₈₀ Hg	0.0000		-8.0000 Syst	8 ms <i>8</i>		$\alpha : 100.00\%$
¹⁷⁶ ₈₀ Hg	0.0000	0+	-11.7245	34 ms <i>+18-9</i>		$\alpha \approx 100.00\%$
¹⁷⁷ ₈₀ Hg	0.0000	(13/2+)	-12.7271	127.3 ms <i>18</i>		$\alpha : 85.00\%$ $\epsilon : 15.00\%$
¹⁷⁸ ₈₀ Hg	0.0000	0+	-16.3232	0.287 s <i>23</i>		$\alpha \approx 70.00\%$ $\epsilon \approx 30.00\%$
¹⁷⁹ ₈₀ Hg	0.0000		-16.9690 Syst	0.93 s <i>11</i>		$\alpha \approx 53.00\%$ $\epsilon \approx 47.00\%$ $\epsilon p \approx 0.15\%$
¹⁸⁰ ₈₀ Hg	0.0000	0+	-20.2447	2.58 s <i>1</i>		$\epsilon : 52.00\%$ $\alpha : 48.00\%$
¹⁸¹ ₈₀ Hg	0.0000	1/2(-)	-20.6740 Syst	3.6 s <i>1</i>		$\epsilon : 69.00\%$ $\alpha : 31.00\%$

Users' Comments

Might I add that I have used the Wallet card now for 7 years. Both as a Health Physics Tech in the US Air Force and as a Radiological Coordinator for the State of California. In many emergency applications (transportation, facility, and terrorism planning) we have found the Cards to be essential in our response and in planning for the response.

Users' Comments - cont

For that reason, when I attend conferences among the Emergency Responders in California, I show them to as many people as I can and explain how helpful they can be as a tool for the responders.

Well done sir, and Thanks

Bill Potter, Coordinator (Radiological)
California Governor's Office of Emergency Services

Users' Comments-2

DOE HQ is re-writing the manual, and wants to standardize all DOE inventory reporting on one source - The National Nuclear Data Center Wallet Cards from BNL.

John R. Shultz, Ph.D.
Nuclear Materials Control and Accountability
Office of Security

DOE Headquarters

Users' Comments-3

Hoping to give one to each of our special ops shifts at our 34 station Fire Department upon doing a Ludlum update.

Gary T. Young, Captain
Fire Station #40
4185 Cedar Springs dr.
Moorpark, California 93021

Users' Comments-4

Over the past 20 years you people have kindly provided these booklets and our students have found them very helpful and benefited much by having them.

Kenneth A. Foland, Professor
Department of Geological Science
Ohio State University

Users' Comments-5

Thank you for supplying the Nuclear Wallet Cards. They were Distributed during

our DOE Rapter Training

(http://www.crcpd.org/TrainingResources/RA_PTER-Info-2004.pdf).

The students, which include

DOE, FBI, Military, and civilian personnel

Users' Comments-5 cont.

They were required to use the book for various information during the training drills. They commended the usefulness of these books and we will definitely start to include them in their response kits. Thanks again for a great resource.

M. S. Windham, RAP Sr. Scientist

Summary

5000 copies produced

Distributed to 50 states' emergency
preparedness

Distributed to various Police and Fire
Departments

Distributed to NY/PD at Republican
Convention

Web/Paper/Palm-Pilot modes