IAEA 60 Years
Atoms for Peace and Development

Overview of IAEA Nuclear Graphite Knowledge Base (NGKB)

Frederik Reitsma - IAEA
Nidia C Gallego - ORNL

International Nuclear Graphite Specialist Meeting

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Mission Statement

- The International Atomic Energy Agency's (IAEA's) Nuclear Graphite Knowledge Base (NGKB), was established in 1999 (under the leadership of Dr. Tony Wichkam), with the goal to preserve and expand the scientific information on the physical, chemical, mechanical, and other properties of graphite, which are relevant to nuclear power, nuclear safety, and other nuclear science and technology applications, and to share that expert knowledge and experience across the international graphite community

- Further developed into a knowledge base (beyond a irradiated graphite repository only of value to experts)

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Home

Welcome to the IAEA Nuclear Graphite Knowledge Base

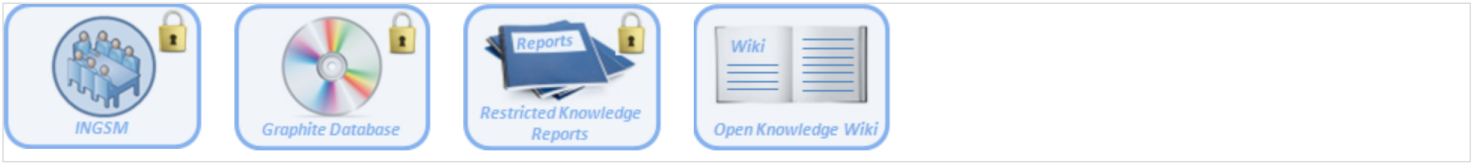
Mission Statement

The aim of this knowledge base is to support the preservation and sharing of expert knowledge and experience, across the international Graphite Community.
The knowledge base contains two levels of knowledge:

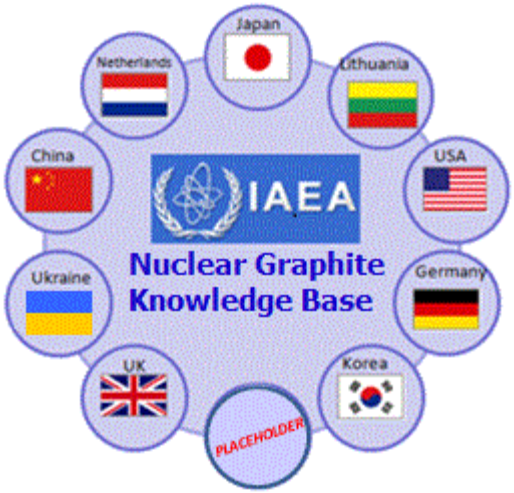
- General information on the subject of Nuclear Graphite
- Specialist knowledge, secured for members of the international project

Please click on the below images to link to the desired section of the knowledge base

Databases



IAEA Nuclear Graphite Knowledge Base



Databases

http://nucleus.iaea.org/sites/graphiteknowledgebase/Pages/home.aspx

Current status of Nuclear Graphite Knowledge Base

- **Graphite Database**: All data captured in Microsoft Excel (>34,000 lines), including source of data and QA rating
- **INGSM** – archive of all INGSM conferences, since 2000
- **Restricted Knowledge Reports:** Specialist knowledge, secured for members of the international project
- **Open Knowledge Wiki**: General information on the subject of Nuclear Graphite

A	B	C	D	E	F	G	H	I	J	K	L
SAMPLE CHARACTERISTICS											
Graphite Grade	Sample Number		Orientation	Manufacture	Coke Source	Binder	Filler	Number of Impregnations	Impregnant	Forming Process	Graphitisation Temperature (°C)

M	N	O	P	Q	R	S	T	U	V	W	X
SAMPLE CHARACTERISTICS				CRYSTALLITE PARAMETERS							
on Additional Information	Neutron Fluence (dpa)	Irradiation Temp (°C)	Irrad. Experiment	a Initial (10^{-10} m)	a Final (10^{-10} m)	c Initial (10^{-10} m)	c Final (10^{-10} m)	La Initial (10^{-10} m)	La Final (10^{-10} m)	Lc Initial (10^{-10} m)	Lc Final (10^{-10} m)

Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
ELASTIC PROPERTIES											
	E-Modulus (Static)			G-Modulus (Static)			E (Dynamic)		E (Dynamic)		
Initial E_0 (GPa)	Final E (GPa)	Final/Initial	E/E_0-1 (%)	Initial (GPa)	Final (GPa)	Final/Initial	Initial (GPa)	Final (GPa)	Final/Initial	E/E_0-1 (%)	Initial Frequ. (10^3/s)

AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
ELASTIC PROPERTIES						ELECTRICAL RESISTIVITY					
		G (Dynamic)		Poisson's Ratio					Fractional	Measuring	
Final Frequ. (10^3/s)	Initial (GPa)	Final (GPa)	Final/Initial	Initial	Final	Initial (Ohm*m*10^{-6})	Final (Ohm*m*10^{-6})	Final/Initial	Change (%)	Temperature (°C)	Initial (10^{-6}/K)

AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH
THERMAL PROPERTIES											STRENGTH
Thermal Expansion Coefficient					Thermal Conductivity				Tensile		
Final (10^{-6}/K)	Temp Range (°C)	Final/Initial	Fract.Chang (%)	Initial k_0 (W/m K)	Final k (W/m K)	k/k_0-1	Meas Temp (°C)	Initial (MPa)	Final (MPa)	Final/Initial	Initial (MPa)

BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT
									DIMENSIONAL CHANGES		
Compr. Final (MPa)	Final/Initial	Initial (MPa)	Bending Final (MPa)	Final/Initial	Initial (mm)	Length Final (mm)	Change (%)	Initial (mm)	Diameter Final (mm)	Change (%)	Thick 1 (mm)

BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF
				ACOUSTIC PROPERTIES				IRRADIATION CREEP			
ness 2 (mm)	Initial (cm^3)	Volume Final (cm^3)	Change (%)	Sonic Velocity Initial (m/s)	Final (m/s)	Atten uation Initial (db/mm)	Final (db/mm)	Applied Stress (MPa)	Creep Strain (%)	Creep Coeff (10^{-35}*m^2/Pa)	

CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR
STORED ENERGY			PORE VOLUME		DENSITY			OTHER PROPERTIES			
		Release	Open Porosity					Initial Mass	Final Mass	Mass Loss	
Total S (J/g)	dS/dt (J/(g*s))	Start Temp (°C)	Initial (%)	Final (%)	Initial (g/cm^3)	Final (g/cm^3)	Change (%)	(g)	(g)	(%)	Ordinal Number

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- The **Creep CRP** TECDOC – publication status??

- Committee meetings are held annually, however the primary focus has shift from data collection to data/knowledge management – including development of taxonomy.

Path to a knowledge base

- The path to transform the NGKB into a modern, user-friendly knowledge base has just started.
  - The IAEA Knowledge Organization System (KOS) is being refined and implemented in other domains, so the lessons learned can be applied here.
  - As a first step, it is important to develop tools, such as subject area taxonomies, or ontologies, used to describe a knowledge domain.
  - For example, the knowledge portal can be integrated with a taxonomy-based search tool, sometimes referred to as a “semantic search,” that leads to the retrieval of more relevant documents.
  - The taxonomy should be developed to comply with international web standards as defined by the World Wide Web Consortium (W3C).

Conclusions

- The NGKB represents a massive effort by dedicated graphite experts over the last 20 years.
- It contains a wealth of nuclear graphite irradiation data and other substantial sources of knowledge.
- The data have been archived and expert judgement has been made on the quality and reliability of the data
- The IAEA continues to support the knowledge base.
  - The modernization process continues
  - It is enhanced using the in-house knowledge preservation drive and the existing KOS.
- Steps already done:
  - a first taxonomy for the expert subject area was created.
  - the use of modern knowledge management approaches
  - the additional value it offers was recognized and emphasized.
- The NGKB should be further promoted
  - to contain quality information on nuclear graphite, past and future
  - To become the preferred source of information for the nuclear graphite community.

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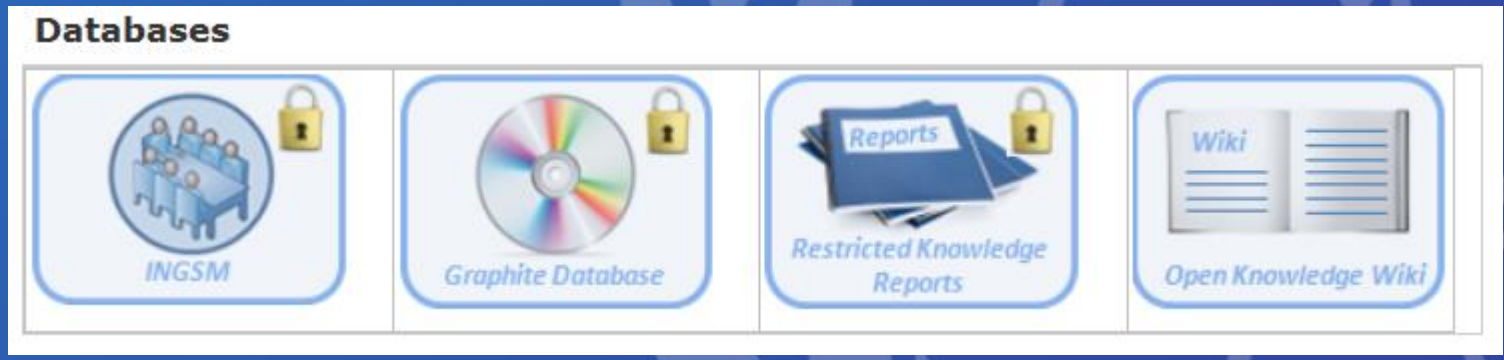
Thank you!

IAEA Nuclear Graphite Knowledge Base



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