National Report: Ukraine

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International Atomic Energy Agency


Chornobyl
Rivne
Kyiv
Khmelnitskiy
South Ukraine
Zaporizhzhe
Sebastopol
Warsaw
Lutsk
Rovno
Kiev
Lviv
Ternopil
Khmelnitskyy
Vinnitsa
Cherkassy
Poltava
Kharkhov
Sumy
Ivano-Frankovsk
Uzhgorod
Khust
Chernovtsy
Kirovohrad
Dnepropetrovsk
Konstantinovka
Slavyansk
Donets'k
Zaporozhe
Nikopol
Mykolayiv
Kherson
Odessa
Melitopol
Berdyansk
Mariupol
SEA OF AZOV
Sevastopol
Simferopol
Bucharest
Craiova
Brasov

Independent regulatory body

- Is an independent regulatory body in place?

  Yes

  (*State Nuclear Regulatory Committee of Ukraine*)
- Explain actions taken to correct a ‘no independence’ situation / timeframe

Legal and regulatory framework

- Is ‘decommissioning’ included in the national legal and regulatory framework?
  Yes
- If ‘No’, explain the actions taken to correct the situation / timeframe

  In accordance with the acting legislation the decommissioning planning must be performed at the operation stage of nuclear installation as early as possible. As a whole the normative-legal basis of Ukraine is sufficient for decision of the current decommissioning tasks.

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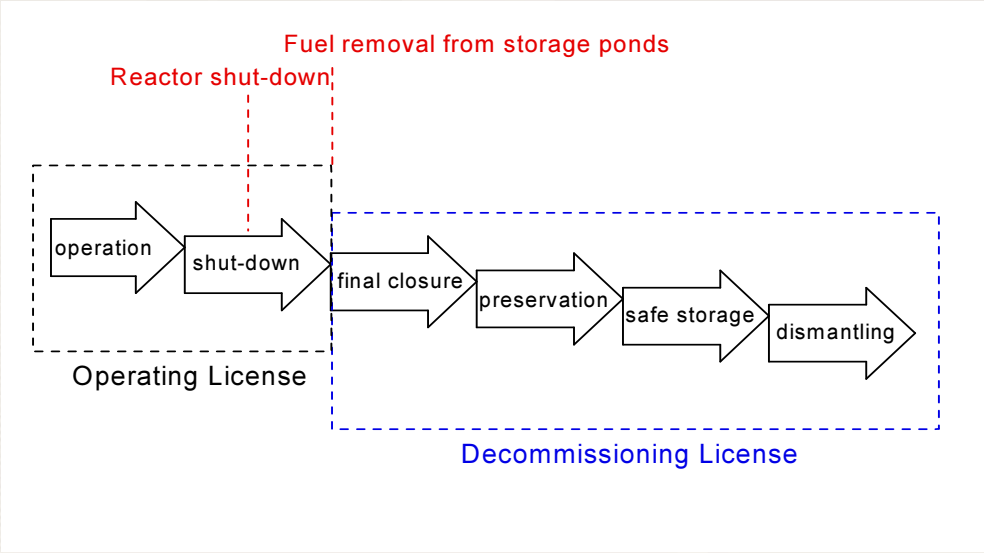
Normative Document NP 306.2.02/1/004-98
"*General Provisions on Safety Assurance of Decommissioning of NNPs and Research Reactors*"

Decommissioning means such complex of measures after nuclear fuel removal that exclude the operation of the facility in purposes for which it was constructed and provide personnel and the public safety and the environment security.



The following decommissioning stages are established:

stage 0 – "Termination of operation (shut down)";
stage 1 – "Final Closure";
stage 2 – "Preservation";
stage 3 – "Long-term safe storage";
stage 4 – "Dismantling".

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Встановлені потужності AEC/NPPs' installed capacity

Назва АЕС NPP	№ енергоблоку Unit №	Тип реактора Type of reactor	Встановлена електрична потужність (МВт) Installed electric capacity (MW)	Початок будівництва Beginning of construction	Енергопуск блоку Startup of the unit
Запорізька АЕС	1	ВВЕР VVER – 1000/320	1 000	04.1980	10.12.1984
Zaporizhzhya NPP	2	ВВЕР VVER – 1000/320	1 000	04.1981	22.07.1985
	3	ВВЕР VVER – 1000/320	1 000	04.1982	10.12.1986
	4	ВВЕР VVER – 1000/320	1 000	01.1984	18.12.1987
	5	ВВЕР VVER – 1000/320	1 000	07.1985	14.08.1989
	6	ВВЕР VVER – 1000/320	1 000	06.1986	19.10.1995
Южно-Українська АЕС	1	ВВЕР VVER – 1000/302	1 000	03.1977	31.12.1982
South-Ukraine NPP	2	ВВЕР VVER – 1000/338	1 000	10.1979	06.01.1985
	3	ВВЕР VVER – 1000/320	1 000	02.1985	20.09.1989
Рівненська АЕС	1	ВВЕР VVER – 440/213	420	08.1976	22.12.1980
Rivne NPP	2	ВВЕР VVER – 440/213	415	08.1976	22.12.1981
	3	ВВЕР VVER – 1000/320	1 000	02.1981	21.12.1986
	4	ВВЕР VVER – 1000/320	1 000	08.1984	16.10.2004
Хмельницька АЕС	1	ВВЕР VVER – 1000/320	1 000	11.1981	22.12.1987
Khmelnitsky NPP	2	ВВЕР VVER – 1000/320	1 000	1983	08.08.2004
Усього / Total	**15**		**13 835**		

“Decommissioning Conception of the operating NPPs in Ukraine”
(the order of the Ministry of fuel and energy of Ukraine No 249 from 12 May 2004)

Concept is the branch-wise normative document determining the main conceptual decisions on decommissioning and contains the results of strategic planning and long-term prediction of activity related to the decommissioning of operating power units.

Analysis of three possible scenarios is based on the different life-time extension.

Both options (***immediate and deferred dismantling)*** are considered.

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Development of decommissioning documents

Plant	Document	Status
Zaporizhzhe NPP	Decommissioning Concept of ZNPP	Submitted to the SNRCU (Regulatory Body) for approval. Examination is in progress.
Rivne NPP	Decommissioning Concept of RNPP	Submitted to the SNRCU (Regulatory Body) for approval. Examination is in progress.
Khmelnitsky NPP	Decommissioning Concept of KhNPP	Submitted to the SNRCU (Regulatory Body) for approval. Decision of a commission of experts was received.
South Ukraine NPP	Decommissioning Concept of SUNPP	Come into force by the order of NAEC from 31 March 2008

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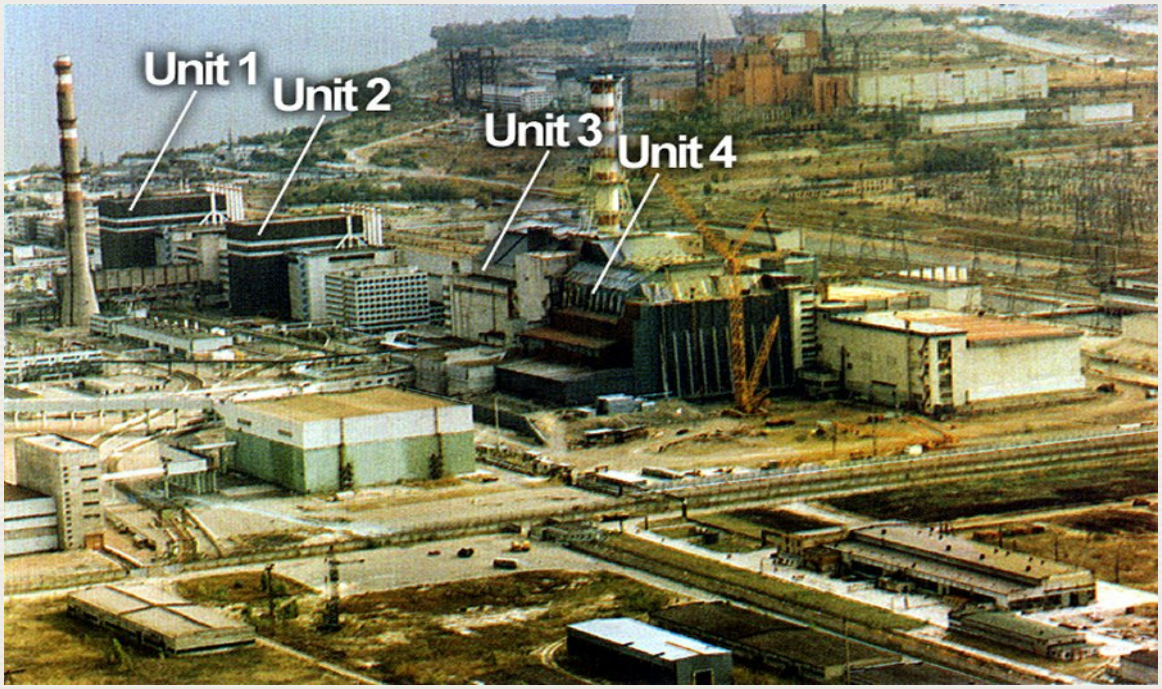
Decommissioning of the Chernobyl NPP

ChNPP had the only RBMK type reactors: unit 2 was shut down after a turbine hall fire in 1991, unit 1 was closed in 1997 and unit 3 closed at the end of 2000 due to international pressure. Unit 4, which was destroyed in the 1986 accident, is enclosed in a large shelter and a new, more durable containment structure is to be built.



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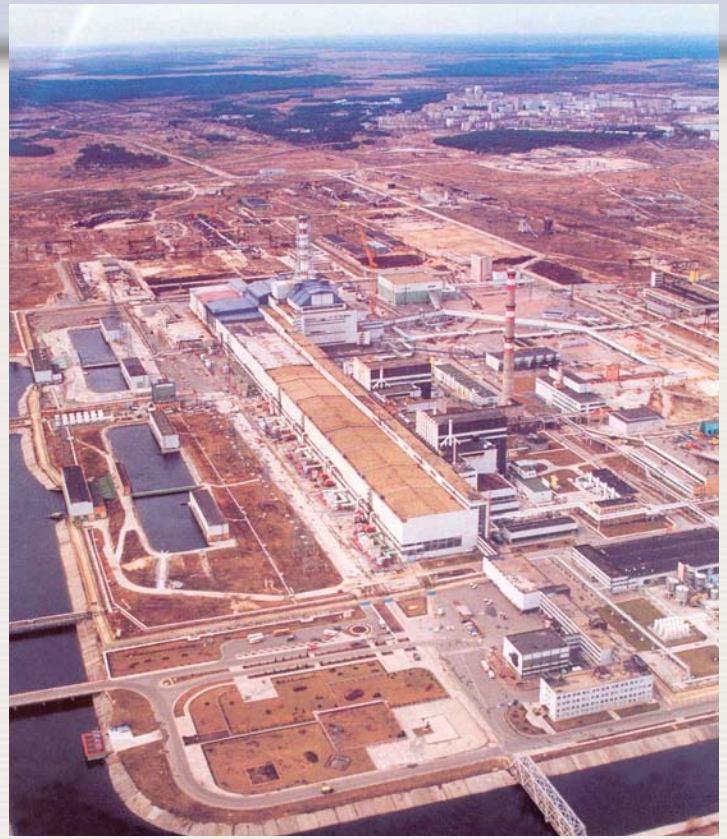
Decommissioning of the Chernobyl NPP



At present the Chernobyl NPP is under decommissioning after a final shutdown of the unit 3 at the end of 2000.

Final goal of the ChNPP decommissioning is the condition described as a “brown field site”.

Decommissioning strategy foresees the long-term safe storage of reactor’s constructions and coolant circuit facilities (up to 50 years) within existing building constructions and dismantling of auxiliary equipment.

Designed characteristics of the complex “Vector”

Total volume – 533644 m^3

Volume of disposed RAW

including:

- disposal facility of type 1 - 156844 m^3
- number of containers - 4668
- disposal facility of type 2 - 376800 m^3
- number of bunkers - 8

Annual volume of RAW for disposal:

- in containers - 25000 m^3

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License / authorisation

- Does the RR have a valid license or other official form of authorization from the regulator
- Explain type of license/authorization
- Explain actions taken to correct a ‘no license’ situation / timeframe

Operational history

- Reactor was commissioned in 1960.
- Reactor operation was terminated in 1993 and till May of 1998 the reactor did not work and its core entirely off-loaded to the SNF wet storage facility (WSF).
- After proof that its equipment complied with new safety standards, operation was authorized until the end of 2000 and the core was reloaded with SNF. The authorization was extended till the end of 2001 and a full license issued in May 2002.
- Consecutive permissions on the reactor operation were issued in 2002, 2005 and 2009.

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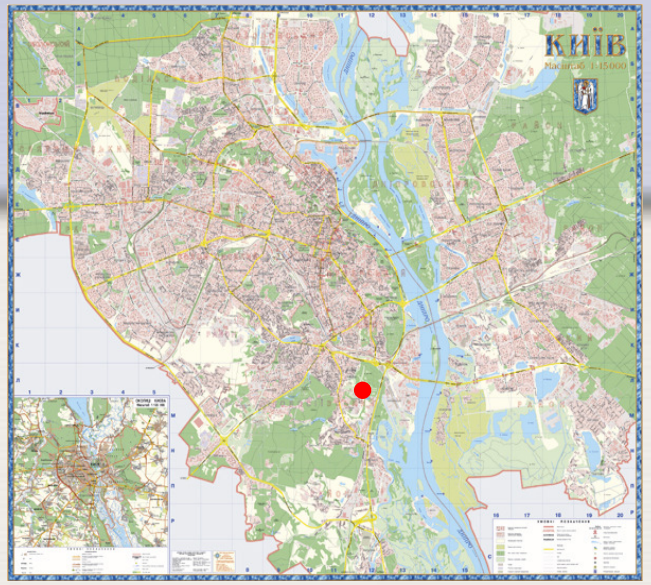
Decommissioning planning / implementation

- Is a decommissioning plan available?
  Yes
- Explain actions taken to finalise a decommissioning plan or explain progress of implementation / timeline / size of the planning or implementation team

Institute for nuclear research



EGP-10K

WWR-M

U-240

U-120

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Technical conditions of reactor

The WWR-M reactor is a heterogeneous water moderated pool-in-tank type research reactor operating with thermal neutrons at a power of 10 MW_{th}, giving a maximum neutron flux of 1.5×10^{14} $cm^{-2}s^{-1}$ at the core center.

- Working life of the vessel and primary circuit is not determined by design documentation.

- Negative changes outside the design limit were not founded as the result of inspections (hydraulic tests, ultrasonics, gamma-raying of welds).

- At present the reactor WWR-M is the unique nuclear installation in Ukraine due to its technical parameters and skilled staff.

- A further reactor safe operation needs the replacement of obsolete equipment, which does not modernized during last time. This activity will increase the reactor safety and give the possibility of the reactor normal operation during next 10-15 years.

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CURRENT STATUS OF REACTOR

"*Strategic Plan for the use of research reactor WWR-M of the Institute for Nuclear Research*" was approved by the National Academy of Sciences of Ukraine in ***July 2004***.

Plan determines the strategic goal as the ***extension of the reactor operation till 2018***.

Operational goals:

- modernization of the reactor management, protection and control system;
- modernization of the spent nuclear fuel storage facility;
- improvement of the fire-preventive system;
- modernization of the emergency power supply system;
- modernization of the emergency core cooling system;
- conversion on low-enriched nuclear fuel;
- removal of the spent nuclear fuel.

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Decommissioning planning

- Preparation for the further decommissioning of the Kiev's research reactor was started in the framework of the ***Decommissioning Concept*** issued in 2001.

- This document contains a common decommissioning approach and measures, which must be detailed and updated with the goal of preparation of the justified decommissioning plan.

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Decommissioning planning

- ***Decommissioning Program*** was elaborated in 2008 (submitted to the Regulatory Body for approval).

- This document determines and substantiates the main technical and organizational measures for the decommissioning preparation and implementation, the sequence of works and measures, necessary conditions for their execution and provision.

- The variant of ***immediate dismantling*** was selected for the WWR-M reasoning from the planes of the further site use with the removal of spent fuel and radwaste outside Kiev and return of the site for the unrestricted use. In accordance with the preliminary estimations, the decommissioning timeframe will not exceed 6 years.

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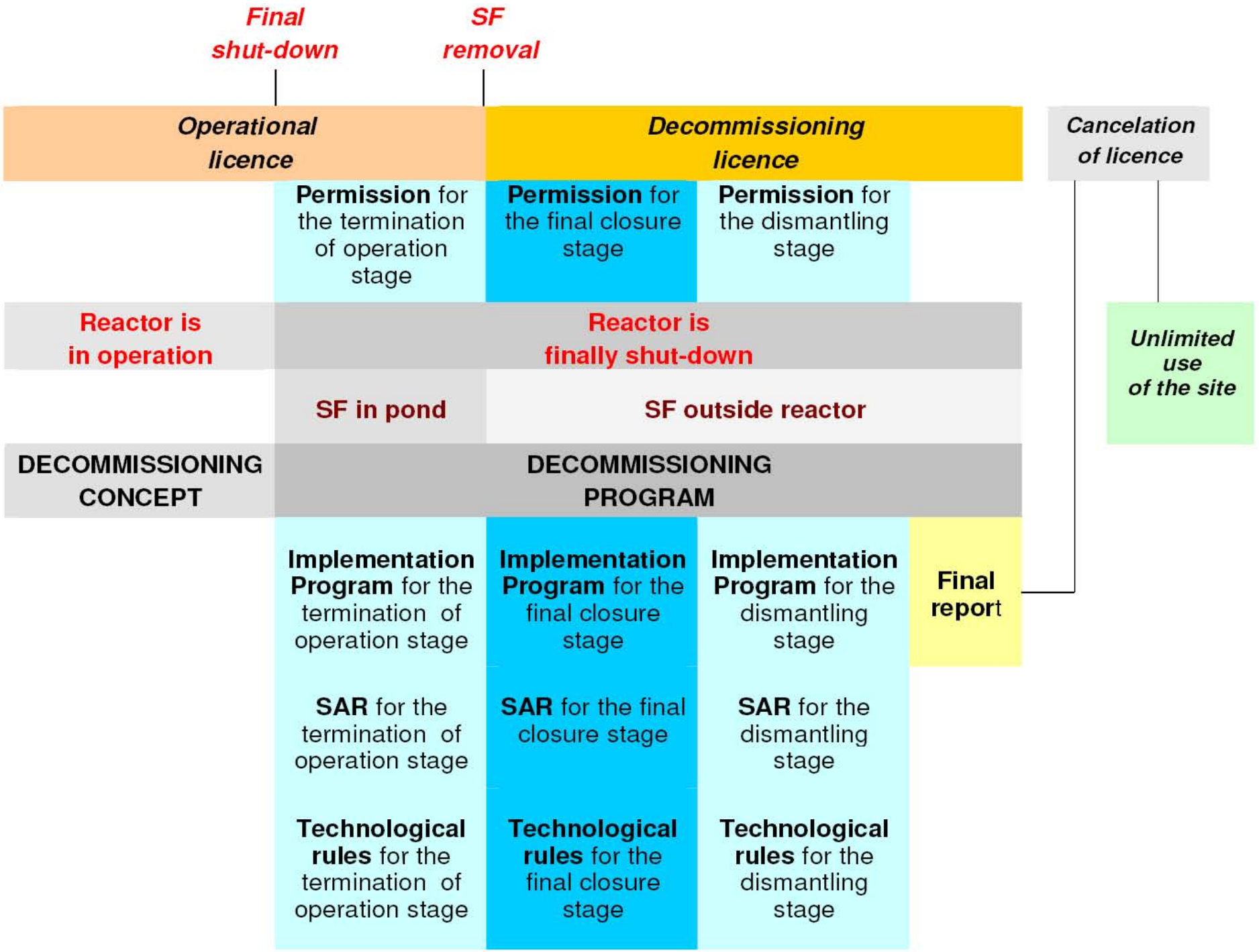
Final shut-down
SF removal
Operational licence
Decommissioning licence
Cancelation of licence
Permission for the termination of operation stage
Permission for the final closure stage
Permission for the dismantling stage
Reactor is in operation
Reactor is finally shut-down
Unlimited use of the site
SF in pond
SF outside reactor
DECOMMISSIONING CONCEPT
DECOMMISSIONING PROGRAM
Implementation Program for the termination of operation stage
Implementation Program for the final closure stage
Implementation Program for the dismantling stage
Final report
SAR for the termination of operation stage
SAR for the final closure stage
SAR for the dismantling stage
Technological rules for the termination of operation stage
Technological rules for the final closure stage
Technological rules for the dismantling stage

DECOMMISSIONING PROGRAM FOR THE WWR-M REACTOR

Decommissioning cost calculation / funding

- Has a decommissioning cost calculation been carried out?
  No
- Explain actions for a cost calculation / timeline
- Is funding secured?
- Yes / No
- Explain funding (Government, dedicated fund)

Progress and Achievements

- What aspects of decommissioning have you successfully addressed to date?
- What aspects of this work would you share with others to help them addressing similar problems?

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Issues / Challenges

- What issues / challenges do you have to develop / implement your decommissioning plan
  - Technical
  - Legal / regulatory
  - Administrative

Today's activities:

- removal of HEU fuel;
- elaboration and partial implementation of the **CERI** Program (*Complex engineering and radiation inspection* = *Radiological survey*);
- sequence of dismantling procedures (*inverted sequence of assembling*); dismantling design:
  - reactor internals;
  - reactor vessel;
  - concrete biological shield;
  - pump-house and primary circuit;
- SAR and EIA for decommissioning stages;
- cost estimations for sub-options

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Conclusion

- Present technical condition of the Kiev's RR WWR-M allows its safe operation no less than 8–10 years in the case of an upgrading of some systems and elements. Extension of the reactor operation till **2018** is considered now as the strategic goal.

- Initial decommissioning planning for the WWR-M was performed in the framework of ***Decommissioning Concept*** issued in 2001. The further development of this document is the ***Decommissioning Program*** (2008). Elaboration of necessary decommissioning documents is in progress now.

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Conclusion (2)

- Further refining of the decommissioning planning for the WWR-M reactor will be the grave task for the future. Experience of this work will be also used for the decommissioning planning for other nuclear installations in the country (and vice versa).

- The self-consistent cost-effectiveness detail Decommissioning Program with the set of substantiating and supporting documents will be a result of the decommissioning planning.

- Exchange of the information and knowledge related to the decommissioning planning and management would be extremely valuable and mutually beneficial.

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THANK YOU