Learning from Experience to Improve Safety

its importance, its mechanisms and its challenges

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The philosopher George Santayana once observed that those who do not learn from the past are condemned to repeat it.

The operating experience from existing plants can provide important lessons from which all should benefit.

FOREWORD: Improving the International System for Operating Experience Feedback INSAG-23

LEARNING…| Its Importance

- Valuable source of information for **learning and improving** the safety and reliability of nuclear power plants.
- Nuclear **industry** as a whole is **collecting** more information **and reporting** on occurrences.
- Every nuclear utility/NPP has or should have its own process and **corrective action programme** for collecting and **incorporating OE.**
- Operators openly **sharing** their operating experience with nuclear operators throughout the world will **benefit all.**
- Many **events can be prevented** if operators make use of lessons learned from previous incidents.
- Key mechanism to **"defence in depth."**

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LEARNING…| Example: Defence in Depth (DiD)

CONCEPT — centered on several levels of protection, including successive barriers to prevent the release of radioactive material to the environment

Two-fold strategy:

- prevent accidents
- *should an accident occur* — limit consequences and prevent evolution to more serious conditions

– Defence in Depth in Nuclear Safety, (INSAG-10, 1996)

– Safety of Nuclear Power Plants: Design (IAEA Nuclear Safety Requirements, No. NS-R-1, 2000)

– Safety of Nuclear Power Plants: Design (IAEA Specific Safety Requirements, No. SSR-2/1, 2012)

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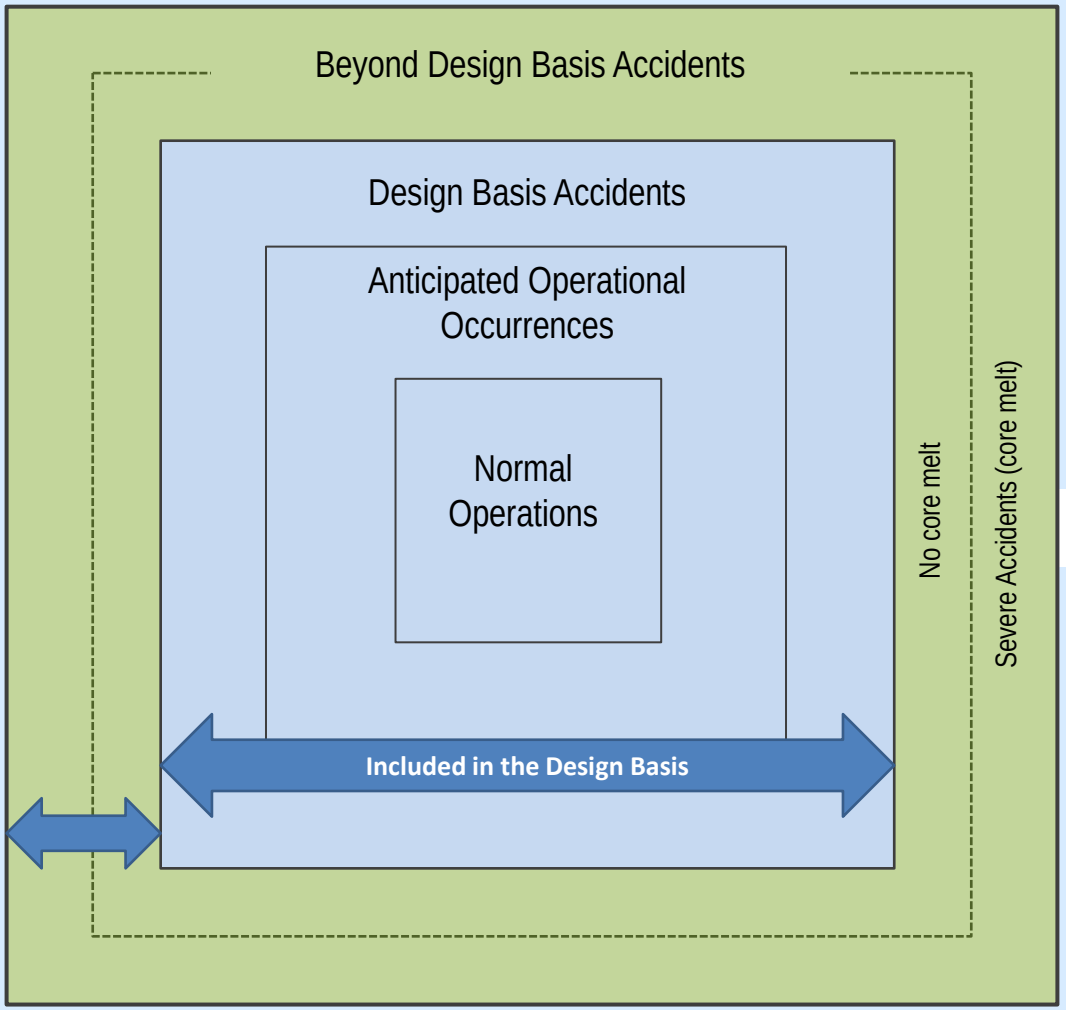
LEARNING…| Example: Defence in Depth (DiD)



NS-R-1, 2000

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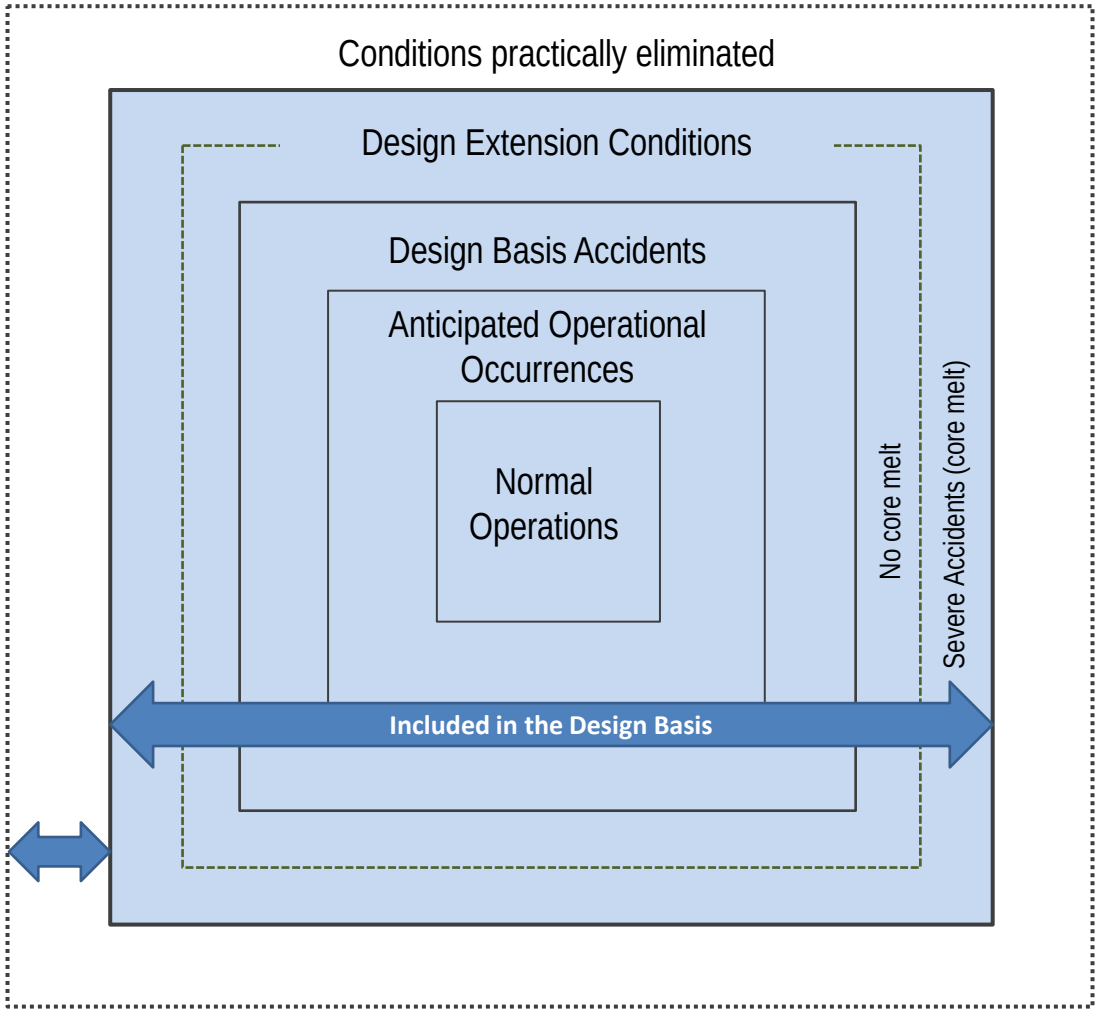
LEARNING…| Example: Defence in Depth (DiD)

Design Extension Conditions — SSR-2/1, 2012

- Accidents that are either more severe than design basis accidents or that involve additional failures.
- Capable to withstand without unacceptable radiological consequences
- Derived on the basis of:
  - Engineering judgment
  - Deterministic assessments
  - Probabilistic assessments

LEARNING…| Example: Defence in Depth (DiD)



SSR-2/1, 2012

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LEARNING…| Example: Defence in Depth (DiD)

Application of Design Extension Conditions

- **Identify** the additional accident scenarios to be addressed in the design.
- **Plan** practicable provisions for the prevention of such accidents or
- **Mitigate** their consequences if they do occur.
- Conditions that could lead to significant radioactive releases are **practically eliminated.**
- If not practically eliminated:
  - Only protective measures that are of limited scope in terms of area and time shall be necessary for protection of the public;
  - Sufficient time shall be made available to implement these measures.

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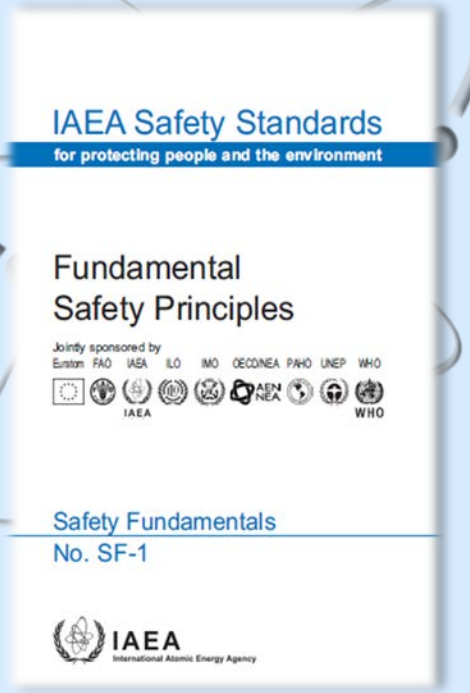
LEARNING…| Its Mechanisms: Role of IAEA



- The IAEA is **required by its Statute** to promote international cooperation.
- Regulating safety is a national responsibility.
- However, radiation risks may transcend national borders, and international cooperation serves to
  - To promote and enhance safety globally by **exchanging experience** and by improving capabilities to control hazards,
  - to prevent accidents, to respond to emergencies and to mitigate any harmful consequences.
- International cooperation is facilitated by international safety related **conventions**, codes of conduct and safety standards.

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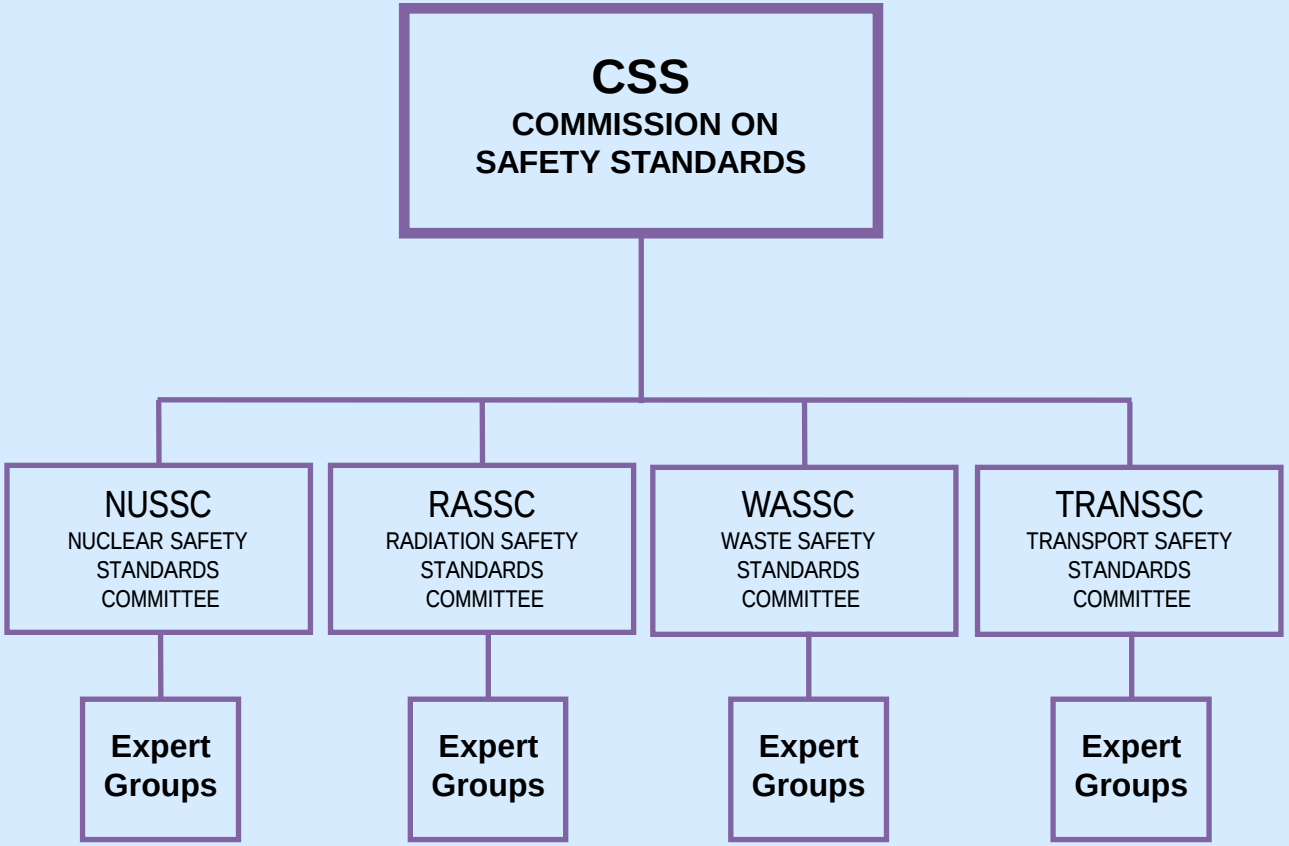
LEARNING…| Its Mechanisms: Safety Standards



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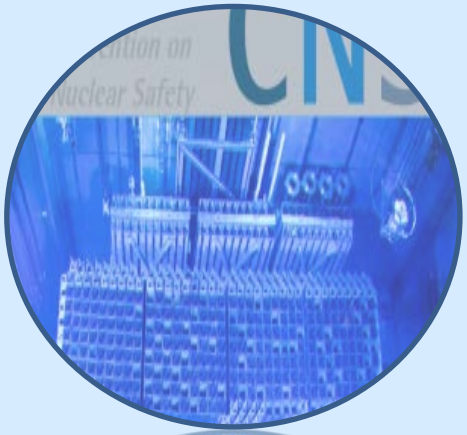
LEARNING…| Its Mechanisms: “The Convention”

1996
Convention on Nuclear Safety



Article 19 —

“Each Contracting Party shall take the appropriate steps to ensure that:

vi. incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body;

vii. programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies.”

- Moreover, international operating experience feedback can only be valuable if at the national level the appropriate arrangements have been made.

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LEARNING…| Its Mechanisms

International Reporting System for Operating Experience (IRS)

for use, within each participating country:
regulators, utilities, NPP staff, technical support,
vendor companies (design firms, engineering contractors, manufacturers, etc.),
research establishments and technical universities

- 31 Member Countries
- Provides:
  - **Secured access** to a database for member countries only to submit event reports on unusual safety events
  - Mechanism to **exchange experience** and to facilitate nuclear safety improvements
  - **Trends** analyzed and **reports** provided online
  - Requires appointment of **National IRS coordinators** and their **active** participation

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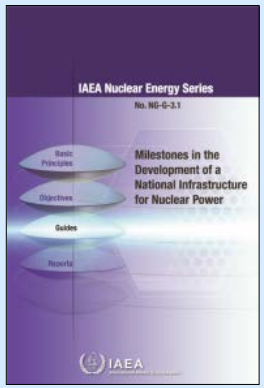
http://www-ns.iaea.org/downloads/ni/irs/irs_guidelines2010.pdf

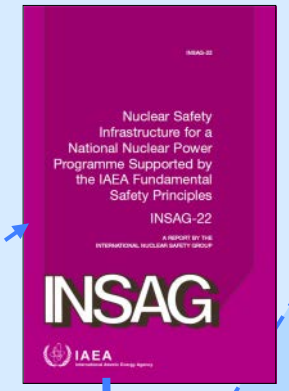
LEARNING…| Safety Standards and Sharing Experience

Establishing the Safety Infrastructure for a Nuclear Power Program (SSG-16)



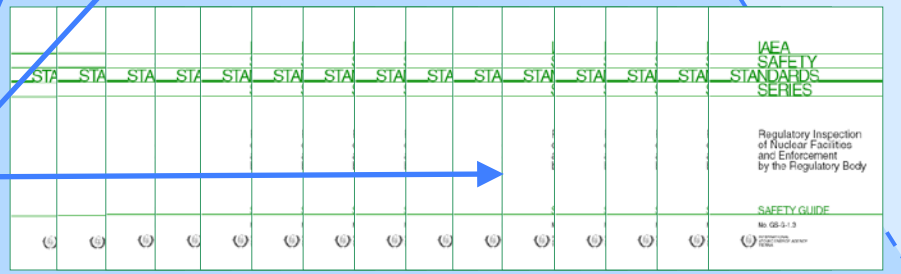
IAEA publication NG-G-3.1

International Nuclear Safety Group's Report-22



FUNDAMENTALS

REQUIREMENTS



GUIDES

IAEA SAFETY STANDARDS

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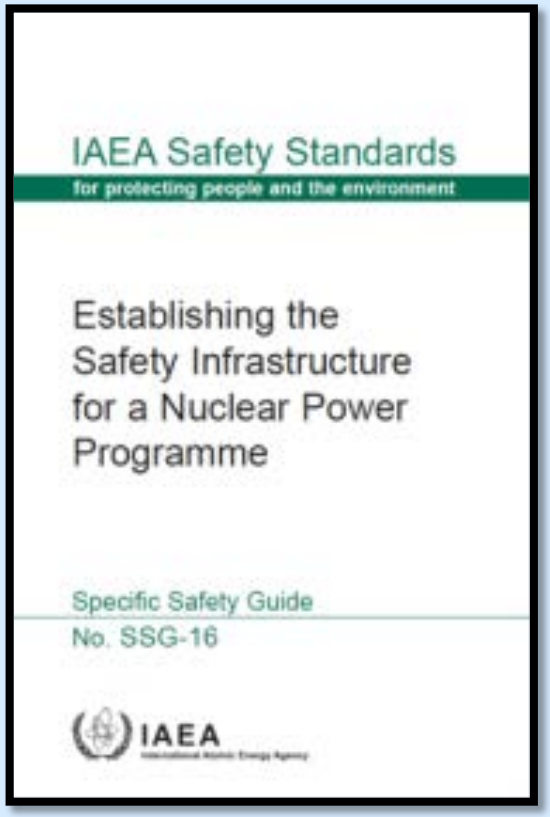
LEARNING…| Safety Standards and Sharing Experience



- IAEA's resource for **regulatory body** development
- Covers ***200 actions*** to be taken by the government, regulatory body and the operating organization for NPP development
- Provides **guidance on how to apply the IAEA Safety Standards** in the development of a nuclear power programme
- **Provides recommendations** in the form of sequential actions on meeting the IAEA safety standards progressively during the development of the safety infrastructure

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LEARNING…| Sharing Experience

- Site and External Events Design (SEED)
- Design and Safety Assessment Review Service (DSARS)
- Operational Safety Review Team (OSART)
- Integrated Regulatory Review Service (IRRS)
- Emergency Preparedness Review Service (EPREV)

and others…

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Learning…| Its Challenges

- Transparency versus confidentiality (finding the balance)
  - Legislative and regulatory stance
  - Collecting and reporting — Agency guidelines and governance in place
  - Participating members charter and terms of reference
- All power reactors are not the same — what learning transfers from one to the next?
  - Similar functions
  - What can you use?
- Requires ACTIVE Participation

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Thank you!

Working together to protect people, society and the environment

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