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Topical Peer Review II Country Review Workshop
'Fire Protection'
30 September – 3 October 2024

National Presentation of SPAIN

Miguel A Jiménez, CSN

National Presentation Outline

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List of candidate installations and their regulation

1. **NPP**

2. **Fuel cycle facilities**

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- Scope. Candidate facilities

Almaraz	NPP	CSN	Council of Industry	NEIL
Cofrentes	NPP	CSN	Council of Industry	NEIL
Vandellós 2	NPP	CSN	Council of Industry	NEIL
Juzbado	FCF	CSN	Council of Industry	other

Additional inspections are carried out by WANO, Nuclear Pool and Quality inspections carried out by internal and external organizations

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1. Nuclear Power Plants

Candidate installations/regulation

TS 01.1 & 01.2

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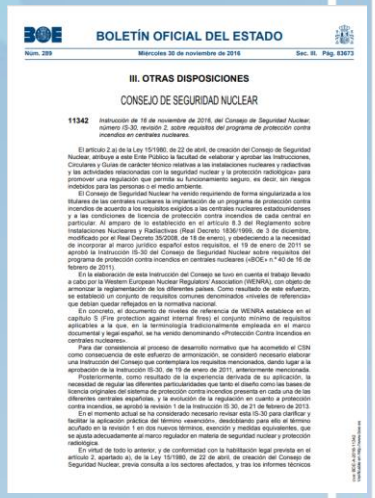

BOLETÍN OFICIAL DEL ESTADO
Núm. 289 Miércoles 30 de noviembre de 2016 Sec. III. Pág. 83673

III. OTRAS DISPOSICIONES

CONSEJO DE SEGURIDAD NUCLEAR

11342 *Instrucción de 16 de noviembre de 2016, del Consejo de Seguridad Nuclear, número IS-30, revisión 2, sobre requisitos del programa de protección contra incendios en centrales nucleares.*

El artículo 2.a) de la Ley 15/1980, de 22 de abril, de creación del Consejo de Seguridad Nuclear, atribuye a este Ente Público la facultad de «elaborar y aprobar las Instrucciones, Circulares y Guías de carácter técnico relativas a las instalaciones nucleares y radiactivas y las actividades relacionadas con la seguridad nuclear y la protección radiológicas» para promover una regulación que permita su funcionamiento seguro, es decir, sin riesgos indebidos para las personas o el medio ambiente.

El Consejo de Seguridad Nuclear ha venido requiriendo de forma singularizada a los titulares de las centrales nucleares la implantación de un programa de protección contra incendios de acuerdo a los requisitos exigidos a las centrales nucleares estadounidenses y a las condiciones de licencia de protección contra incendios de cada central en particular. Al amparo de lo establecido en el artículo 8.3 del Reglamento sobre Instalaciones Nucleares y Radiactivas (Real Decreto 1836/1999, de 3 de diciembre, modificado por el Real Decreto 35/2008, de 18 de enero), y obedeciendo a la necesidad de incorporar al marco jurídico español estos requisitos, el 19 de enero de 2011 se aprobó la Instrucción IS-30 del Consejo de Seguridad Nuclear sobre requisitos del programa de protección contra incendios en centrales nucleares («BOE» n.º 40 de 16 de febrero de 2011).

En la elaboración de esta Instrucción del Consejo se tuvo en cuenta el trabajo llevado a cabo por la Western European Nuclear Regulators' Association (WENRA), con objeto de armonizar la reglamentación de los diferentes países. Como resultado de este esfuerzo, se estableció un conjunto de requisitos comunes denominados «niveles de referencia» que debían quedar reflejados en la normativa nacional.

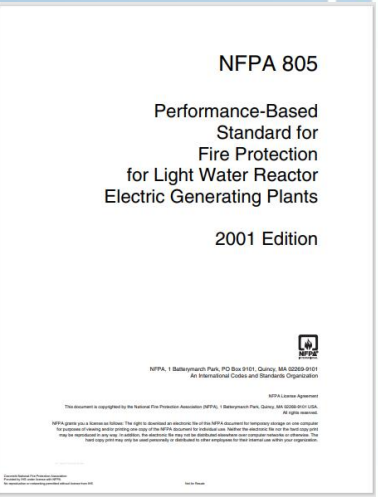
En concreto, el documento de niveles de referencia de WENRA establece en el capítulo S (Fire protection against internal fires) el conjunto mínimo de requisitos aplicables a la que, en la terminología tradicionalmente empleada en el marco documental y legal español, se ha venido denominando «Protección Contra Incendios en centrales nucleares».

Para dar consistencia al proceso de desarrollo normativo que ha acometido el CSN como consecuencia de este esfuerzo de armonización, se consideró necesario elaborar una Instrucción del Consejo que contemplara los requisitos mencionados, dando lugar a la aprobación de la Instrucción IS-30, de 19 de enero de 2011, anteriormente mencionada.

Posteriormente, como resultado de la experiencia derivada de su aplicación, la necesidad de regular las diferentes particularidades que tanto el diseño como las bases de licencia originales del sistema de protección contra incendios presenta en cada una de las diferentes centrales españolas, y la evolución de la regulación en cuanto a protección contra incendios, se aprobó la revisión 1 de la Instrucción IS 30, de 21 de febrero de 2013.

En el momento actual se ha considerado necesario revisar esta IS-30 para clarificar y facilitar la aplicación práctica del término «exención», desdoblando para ello el término acuñado en la revisión 1 en dos nuevos términos, exención y medidas equivalentes, que se ajusta adecuadamente al marco regulador en materia de seguridad nuclear y protección radiológica.

En virtud de todo lo anterior, y de conformidad con la habilitación legal prevista en el artículo 2, apartado a), de la Ley 15/1980, de 22 de abril, de creación del Consejo de Seguridad Nuclear, previa consulta a los sectores afectados, y tras los informes técnicos


NFPA 805

Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants

2001 Edition

NFPA, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

NFPA License Agreement

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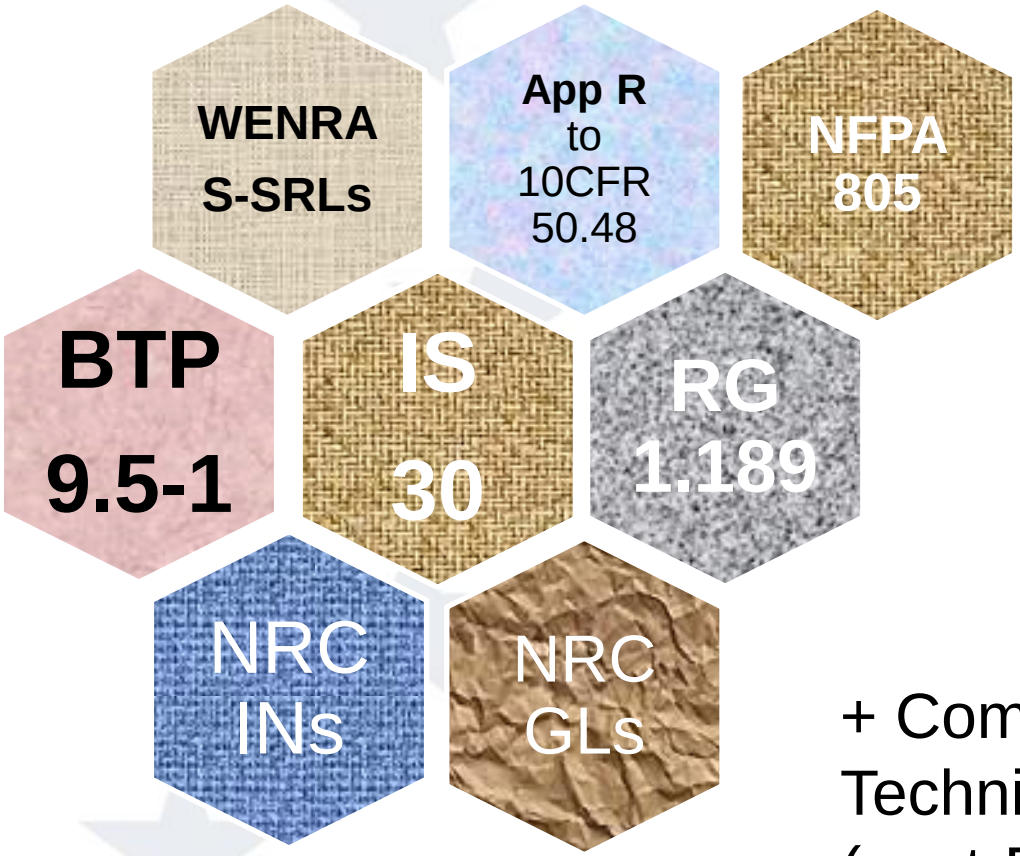
- Spanish Nuclear Regulation on FP in operating NPPs



+ Complementary Technical Instructions (post-Fukushima, etc.)

TS 01.1 & 01.2

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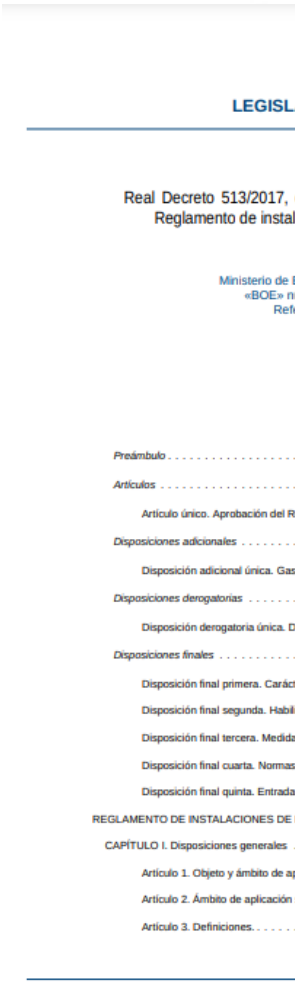
- Other Regulation on FP applicable


LEGISL

Real Decreto 513/2017,
Reglamento de instal

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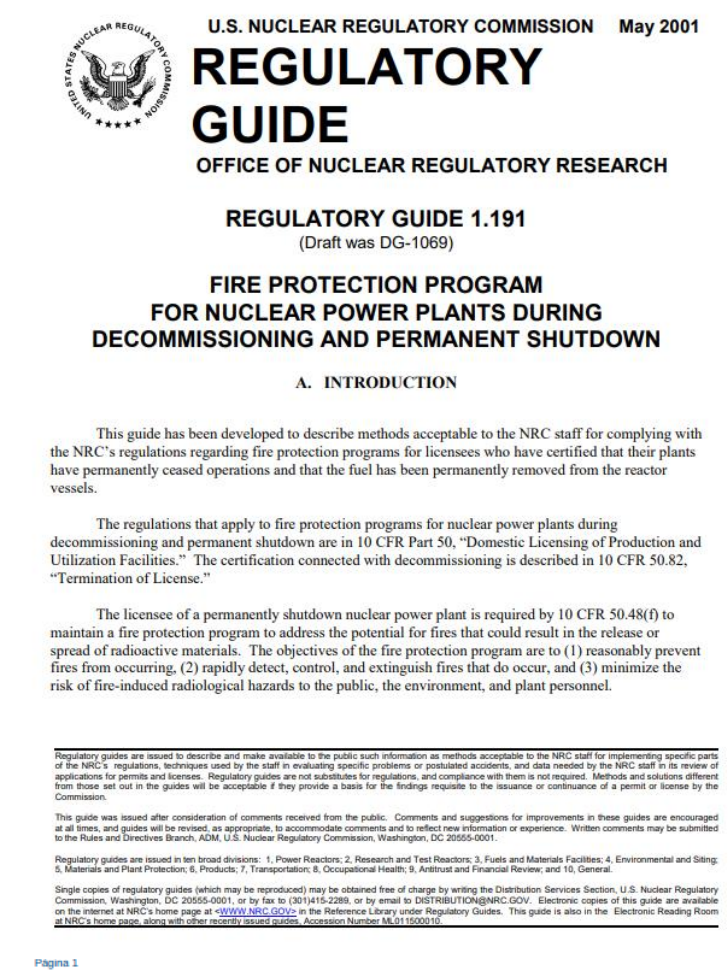
Preámbulo . . . . . .
Artículos . . . . . .
Artículo único. Aprobación del R
Disposiciones adicionales . . . . . .
Disposición adicional única. Gas
Disposiciones derogatorias . . . . . .
Disposición derogatoria única. D
Disposiciones finales . . . . . .
Disposición final primera. Carác
Disposición final segunda. Habil
Disposición final tercera. Medida
Disposición final cuarta. Normas
Disposición final quinta. Entrada
REGLAMENTO DE INSTALACIONES DE
CAPÍTULO I. Disposiciones generales
Artículo 1. Objeto y ámbito de ap
Artículo 2. Ámbito de aplicación
Artículo 3. Definiciones. . . . . .


U.S. NUCLEAR REGULATORY COMMISSION May 2001

REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 1.191
(Draft was DG-1069)

FIRE PROTECTION PROGRAM FOR NUCLEAR POWER PLANTS DURING DECOMMISSIONING AND PERMANENT SHUTDOWN

A. INTRODUCTION

This guide has been developed to describe methods acceptable to the NRC staff for complying with the NRC's regulations regarding fire protection programs for licensees who have certified that their plants have permanently ceased operations and that the fuel has been permanently removed from the reactor vessels.

The regulations that apply to fire protection programs for nuclear power plants during decommissioning and permanent shutdown are in 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." The certification connected with decommissioning is described in 10 CFR 50.82, "Termination of License."

The licensee of a permanently shutdown nuclear power plant is required by 10 CFR 50.48(f) to maintain a fire protection program to address the potential for fires that could result in the release or spread of radioactive materials. The objectives of the fire protection program are to (1) reasonably prevent fires from occurring, (2) rapidly detect, control, and extinguish fires that do occur, and (3) minimize the risk of fire-induced radiological hazards to the public, the environment, and plant personnel.

Regulatory guides are issued to describe and make available to the public such information as methods acceptable to the NRC staff for implementing specific parts of the NRC's regulations, techniques used by the staff in evaluating specific problems or postulated accidents, and data needed by the NRC staff in its review of applications for permits and licenses. Regulatory guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

This guide was issued after consideration of comments received from the public. Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience. Written comments may be submitted to the Rules and Directives Branch, ADM, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

Regulatory guides are issued in ten broad divisions: 1, Power Reactors; 2, Research and Test Reactors; 3, Fuels and Materials Facilities; 4, Environmental and Siting; 5, Materials and Plant Protection; 6, Products; 7, Transportation; 8, Occupational Health; 9, Antitrust and Financial Review; and 10, General.

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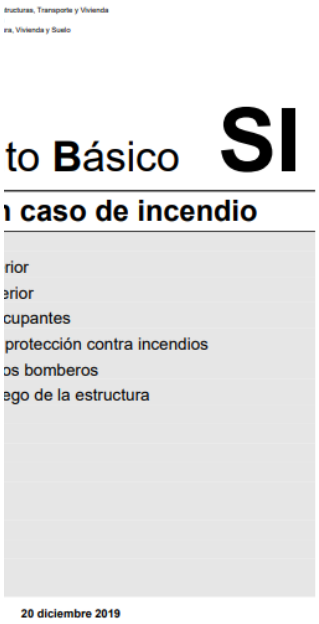
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20 diciembre 2019

Fire safety analysis (FSA) (cf TS 02.1)

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Fire safety objective.

Safe shutdown:

- ***Deterministic approach****: Hot standby (PWR) or shutdown (BWR) and capable to reach Cold SD in 72 h (deterministic approach), or*
- ***Probabilistic approach****: ability to reach a safe and stable condition of the plant (k_{eff}<0.99), with the coolant temperature at or below that defined for the hot standby mode*

and

- *Adequate **SFP cooling***
- ***Confinement of radiological** materials*

Fire safety analysis

Fire safety analysis (FSA)
(cf TS 02.1)

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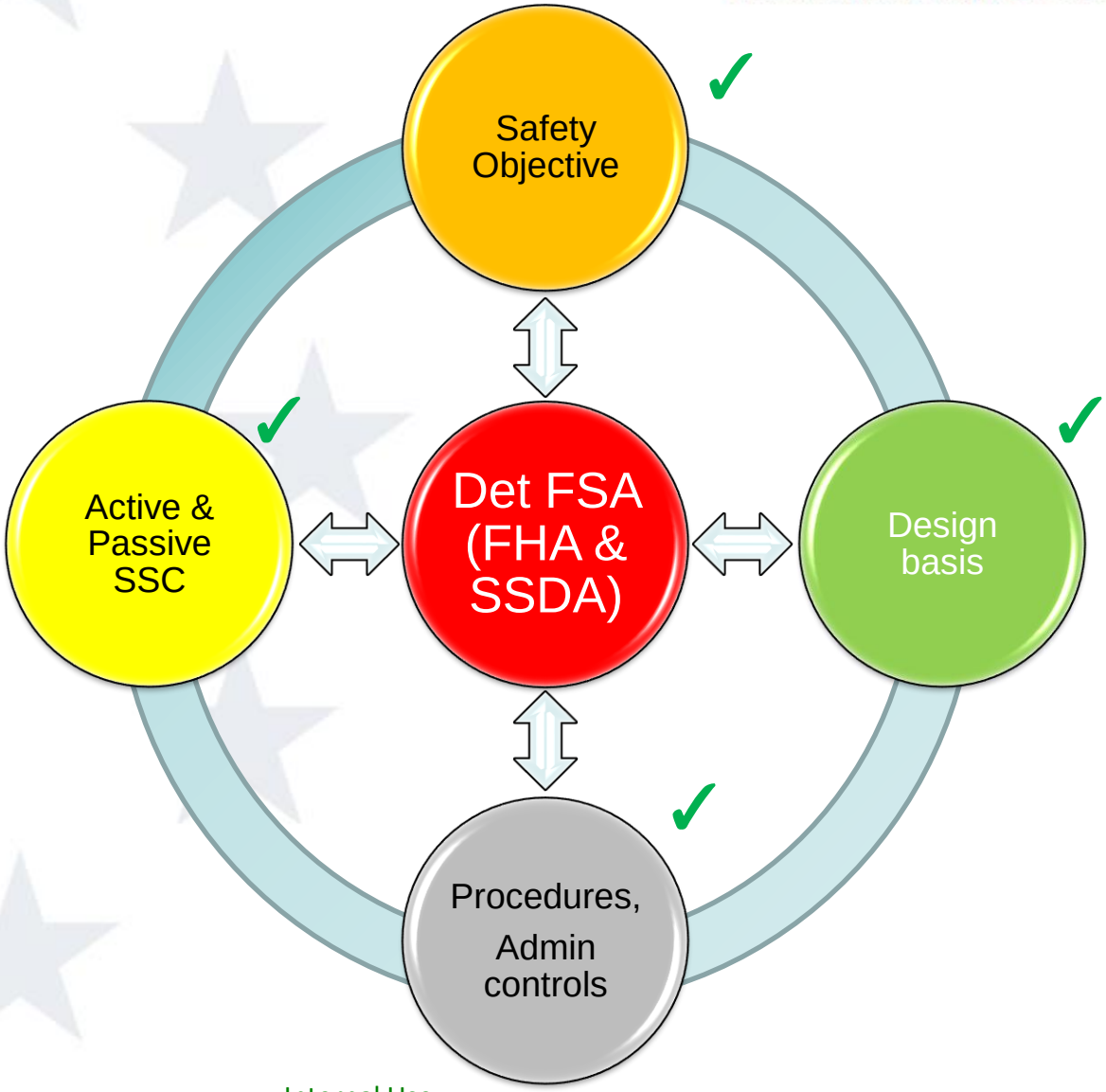

Fire safety analysis (FSA) (cf TS 02.1)

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General assumptions of deterministic FSA:

- Consideration of a **single fire** and its **spread**, where there is fixed and/or transient combustible materials used in normal operations (power, refueling, maintenance) **up to a barrier**, which, if not adequately justified, should be **3h FR**. No credit is given therefore to either FP Brigade or FP active systems.
- **Combination** of a fire with other initiating events caused by the fire (e.g. LOOP).
- Consideration of **LOOP** for those fire areas containing equipment with alternative or dedicated shutdown (MCR).

Fire safety analysis (FSA) (cf TS 02.1)

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General assumptions of deterministic FSA (contd.):

- Analysis of **associated circuits** that may adversely affect safe shutdown
- Safety-relevant SSCs in the field of FP.

Include, as a minimum those:

- Required to reach and maintain the SSD condition in the event of fire, as well as those which may adversely affect the ability to achieve it
- Perform safety-related functions or may impede or impact the performance of such functions
- Whose malfunction could lead to an external radioactive release

Fire safety analysis (FSA) (cf TS 02.1)

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- **PSA scope**
  - **Fire PSA must comply with**
    - **NUREG/CR-6850,**
    - **NUREG-1805, Nuclear Power Plant Fire Modeling Analysis Guidelines (NPP FIRE MAG)**
    - **NUREG-1921 in general**
    - **NUREG/CR-7114 for LPSD PSA**
  - **Fire PSA must comply with Capability Category II as from ASME/RANS RA-Sa-2009 Standard for PRA for plants with risk informed – performance based licensing bases for FP (NFPA-805)**

Fire PSA Level	At power	Low power and SD
Level 1	✓	✓
Level 2	✓	✓

Fire safety analysis (FSA)
(cf TS 02.1)

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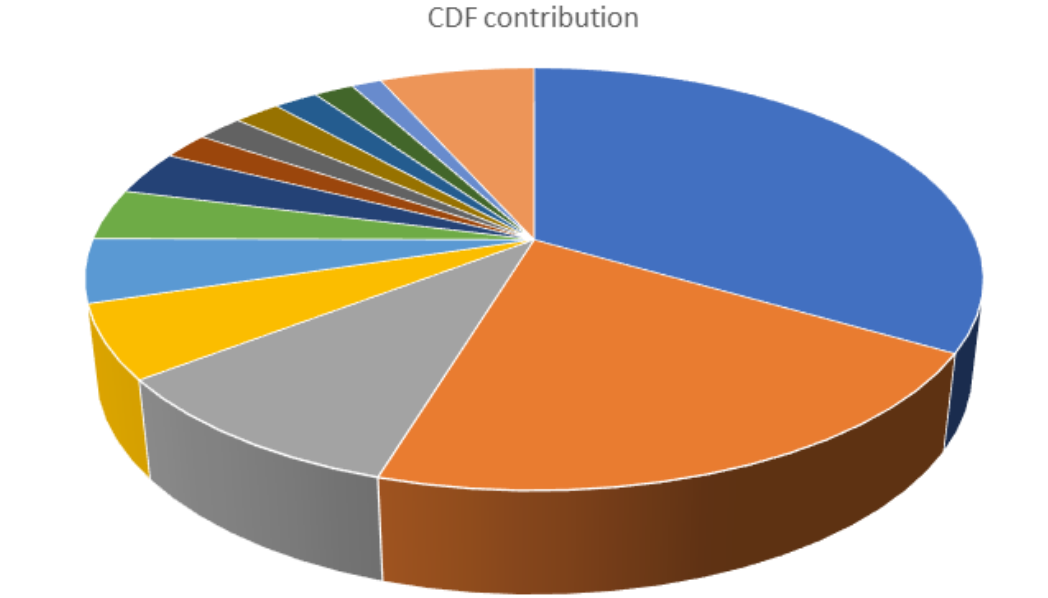
- **CDF contribution**



Fire safety analysis (FSA) (cf TS 02.1)

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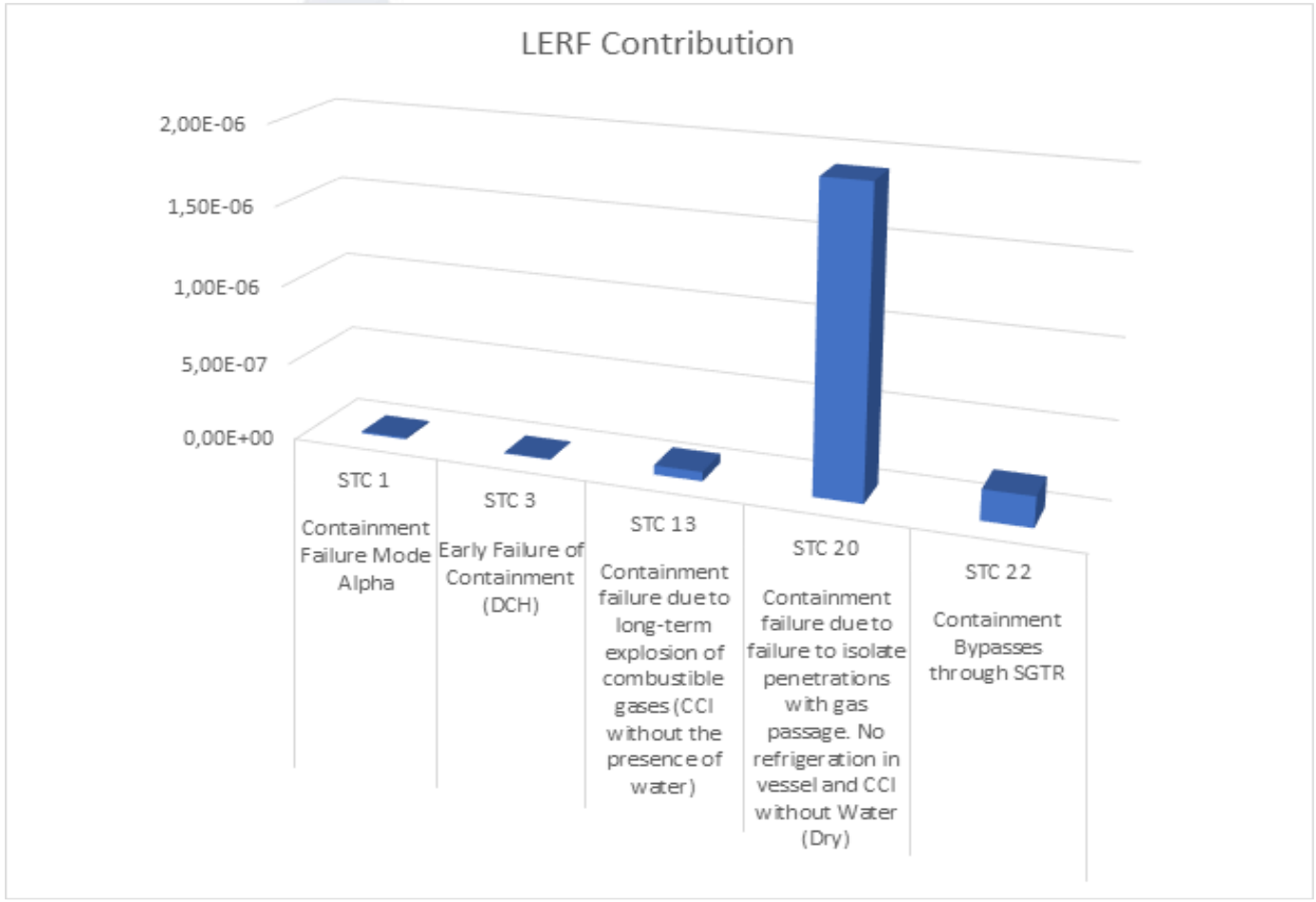
- **LERF contribution**



Fire safety analysis (FSA) (cf TS 02.1)

NPP Almaraz

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- **Most penalising scenarios (deterministic/PSA)**
- **Deterministic. Design against:**
  - **Fire + SSE**
  - **Fire + flood**
  - **MCR and dedicated SD: Fire + LOOP**
  - **Design fire for SF cask and container (aircraft impact, FDS + FLUENT analyses)**
- **Design extension to face loss of large areas**
- **PSA:**
  - **Fire scenarios in rooms in the electrical and the safeguards buildings (CDF).**
  - **Failure of containment penetration isolation with no core cooling and dry CCI (LERF).**

Fire safety analysis (FSA) (cf TS 02.1)

NPP Cofrentes

European Nuclear Safety Regulators Group

- **PSA scope**
  - **Fire PSA must comply with**
    - **NUREG/CR-6850,**
    - **NUREG-1805, Nuclear Power Plant Fire Modeling Analysis Guidelines (NPP FIRE MAG)**
    - **NUREG-1921 for human actions**
    - **NUREG/CR-7114 for LPSD PSA**

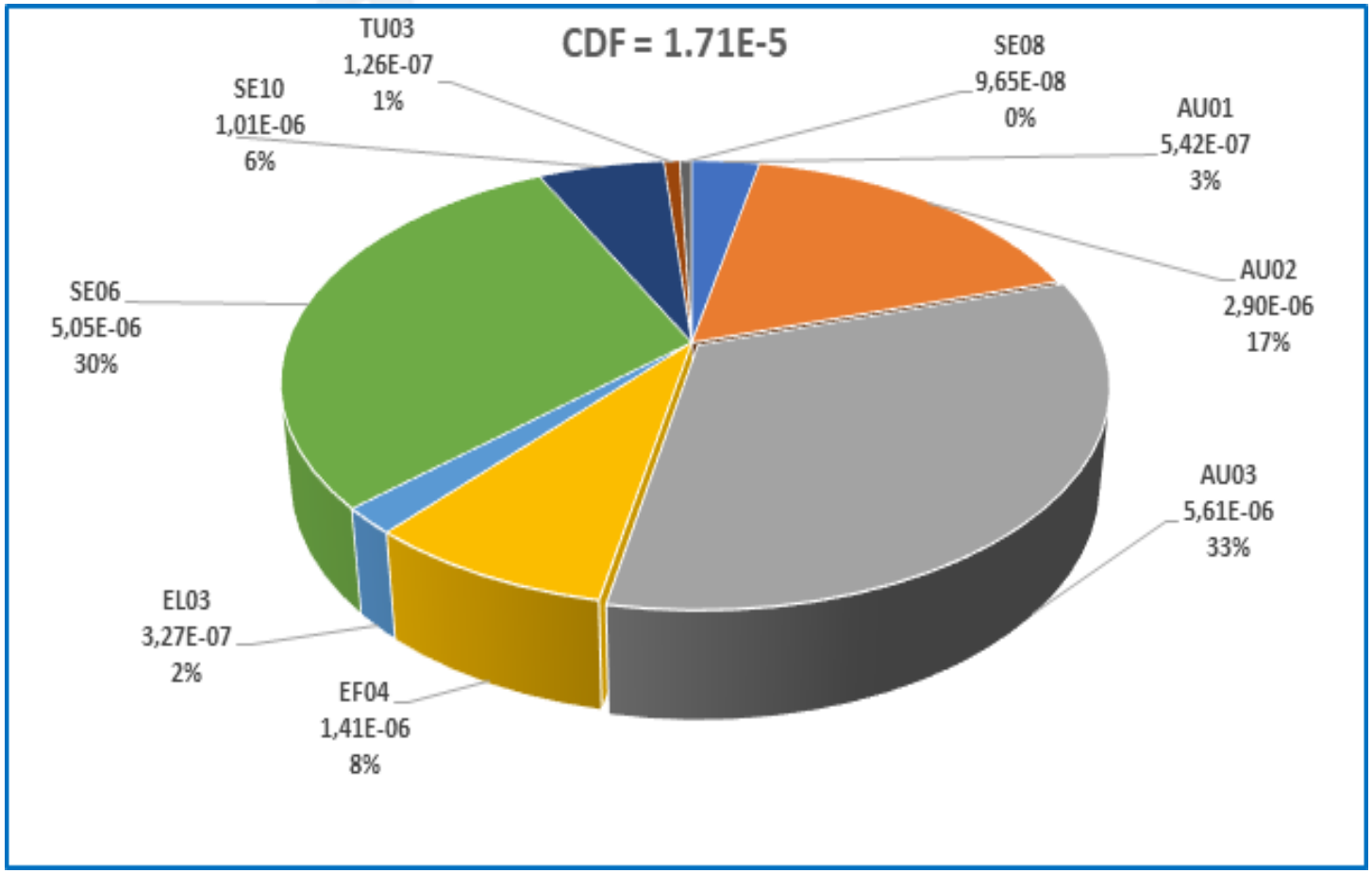
Fire PSA Level	At power	Low power and SD
Level 1	✓	✓
Level 2	✓	**by end 2024**

Fire safety analysis (FSA)
(cf TS 02.1)

NPP Cofrentes

European Nuclear Safety Regulators Group

- **CDF contribution at power**



Fire safety analysis (FSA)
(cf TS 02.1)

NPP Cofrentes

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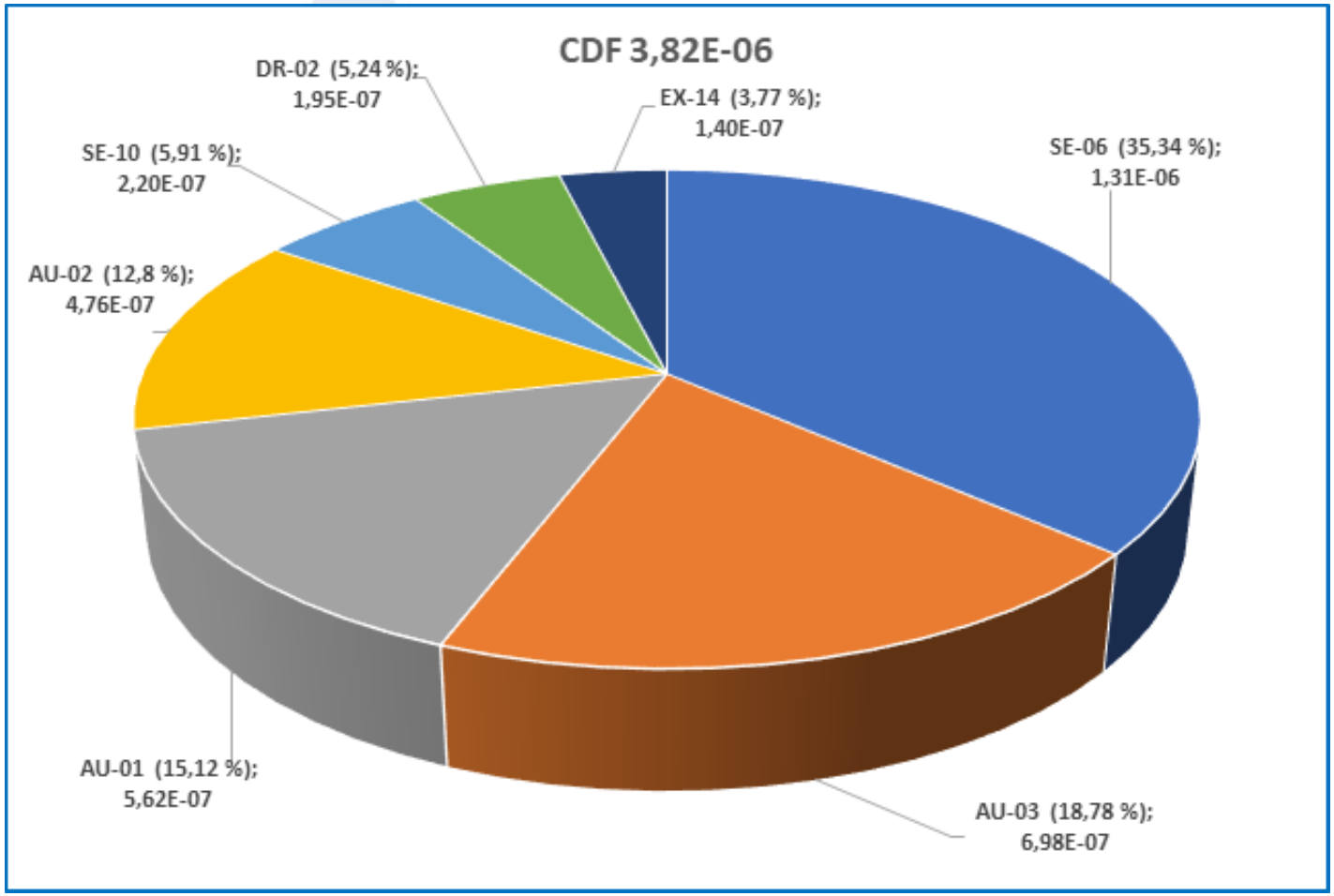
- **CDF contribution at LPSD**



Fire safety analysis (FSA) (cf TS 02.1)

NPP Cofrentes

European Nuclear Safety Regulators Group

- **Most penalising scenarios (deterministic/PSA)**
- **Deterministic. Design against:**
  - **Fire + SSE**
  - **Fire + flood**
  - **MCR and dedicated SD: Fire + LOOP**
  - **Design fire for SF cask and container**

- **Design extension to face loss of large areas**

- **PSA:**
  - **Fire scenarios in rooms in the auxiliary and the service buildings (CDF).**
  - **Fire scenarios with early containment failure and drywell by-pass (LERF).**
  - **Fire scenarios with early containment failure and late drywell bypass (LRF).**

Fire safety analysis (FSA) (cf TS 02.1)

NPP Vandellòs 2

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- **PSA scope**
  - **Fire PSA must comply with**
    - **NUREG/CR-6850,**
    - **NUREG-1805**
    - **NUREG-1921 in general for human actions**
    - **NUREG/CR-7114 for LPSD PSA**

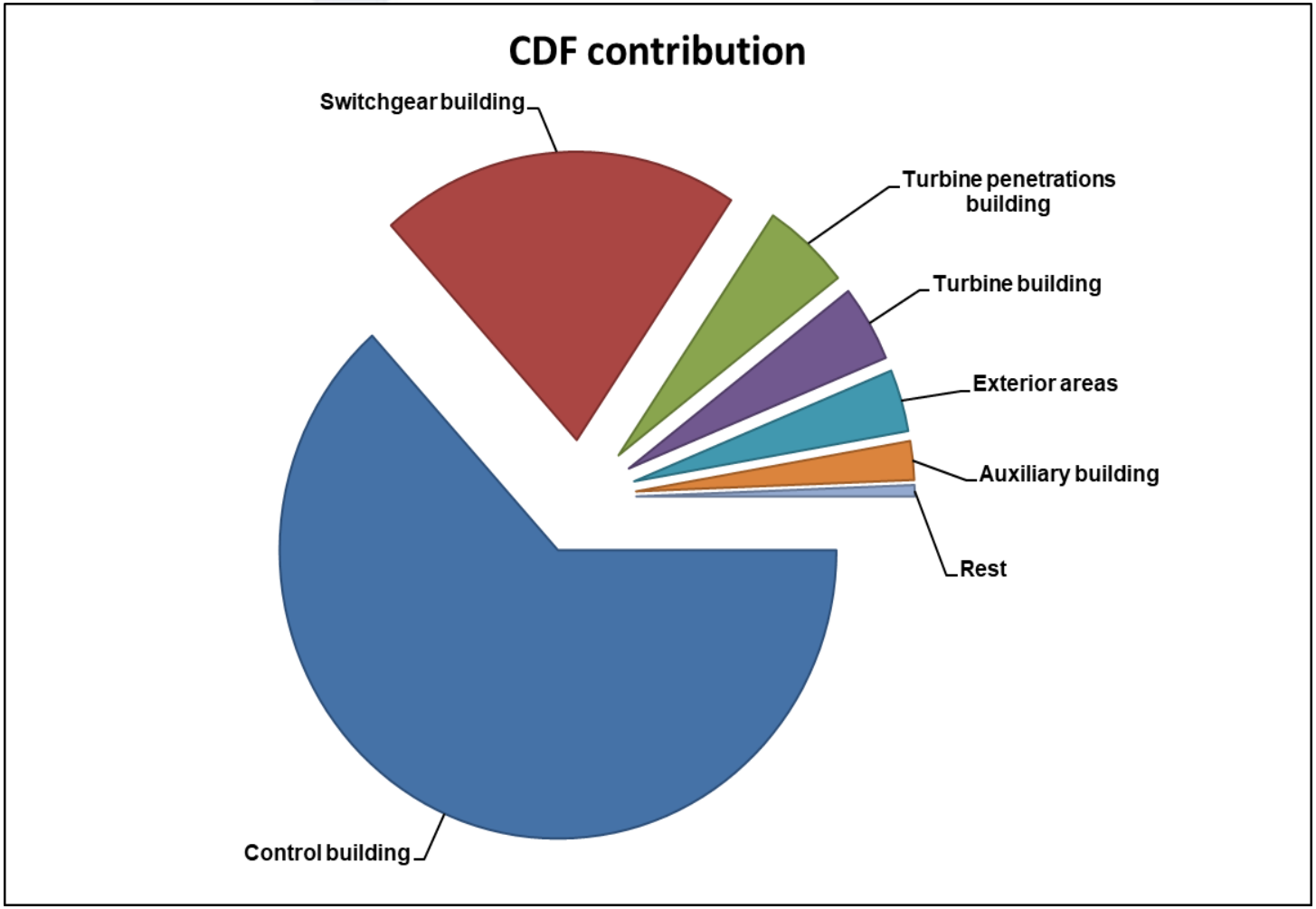
Fire PSA Level	At power	Low power and SD
Level 1	✓	✓
Level 2	✓	✓

Fire safety analysis (FSA)
(cf TS 02.1)

NPP Vandellós 2

European Nuclear Safety Regulators Group

- **CDF contribution at power**

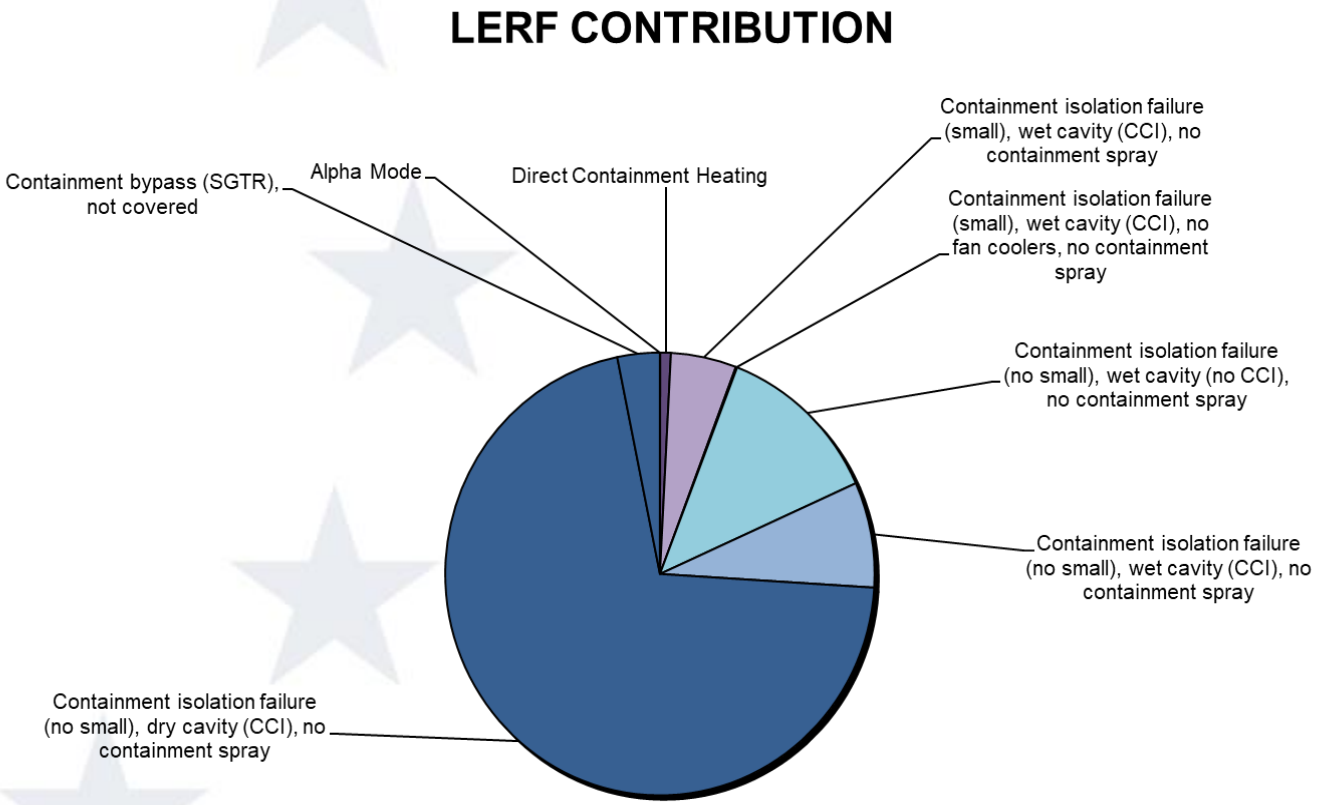


Fire safety analysis (FSA)
(cf TS 02.1)

NPP Vandellós 2

European Nuclear Safety Regulators Group

- **LERF contribution at power**



Fire safety analysis (FSA) (cf TS 02.1)

NPP Vandellós 2

European Nuclear Safety Regulators Group

- **Most penalising scenarios (deterministic/PSA)**
- **Deterministic. Design against:**
  - **Fire + SSE**
  - **Fire + flood**
  - **MCR and dedicated SD: Fire + LOOP**
- **Design extension to face loss of large areas**
- **PSA:**
  - **Fire scenarios in rooms in the control (MCR) and the switchgear buildings (CDF).**
  - **Failure of containment penetration isolation with no containment spray and dry CCI (LERF).**

Fire detection (cf TS 03.2.1)

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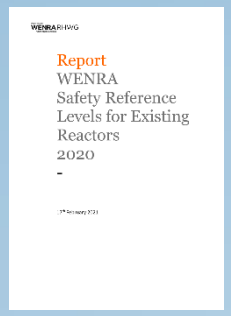

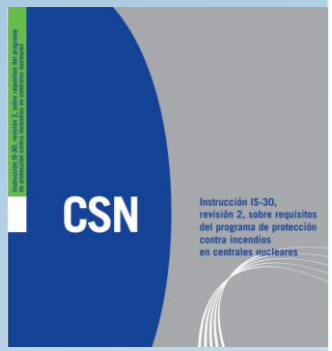

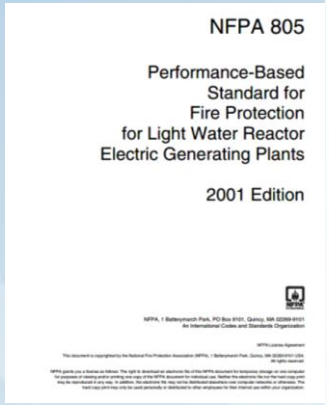

- Fire detection and alarm systems meet the **WENRA reference levels** SV 6.8 and SV 6.11

- **IS-30** Articles 3.4.1, 3.4.13 and Annex A.1
- **SG 1.19** Article 9.1
- Design standard is NFPA 72

- For **NFPA-805** facilities: sections 3.8 (Fire Alarm and Detection Systems), 3.8.1 (Fire Alarm) and 3.8.2 (Detection).

Fire detection (cf TS 03.2.1)

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Criteria for selection and location:

- Designed and installed in the required areas according to the risk analysis and are tested during commissioning for correct operation and also periodically (TRM).
- Type of detectors according to expected behaviour of fire/smoke start, growth and spread.
- Areas with SSC-IS and no fire detectors require a specific approval by the regulator based on DiD and CM considerations.

Fire suppression (cf TS 03.2.2)

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Active FP systems. Regulation applicable.

- The requirements applicable to the fire suppression systems are given in Articles 3.4.2, 3.4.3, 3.4.4, 3.4.12, 3.4.13 and Annex A of IS-30 and points 9.2, 9.3, 9.4, 9.5, 9.6 and 10 of SG 1.19.
- NFPA-805 plants must also comply with the following articles: 3.5, 3.6, 3.7, 3.9 and 3.10.
- Design, maintenance and inspection as from NFPA standards (TRM).

Fire suppression (cf TS 03.2.2)

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Active FP systems:

- Prevent fires and explosions or minimise their consequences in fire areas containing safety-important SSCs.
- Main and support suppression systems are defined according to the fire risk and response at every fire area (fire load, fire growth, accessibility for manual extinction).
- Failure, breakdown, spurious or inadvertent operation does not prevent safety important SSCs from performing their function.
- Preferably water-based, gas-based otherwise.

Fire suppression (cf TS 03.2.2)

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Fire-fighting organization and fire brigade (IS-30, section 3.7)

An organization in place, well defined and identified.

Two teams: **First intervention** team and **second response** team.

First Intervention: Equipped and trained fire brigade with a minimum composition of **5 members per shift**, dedicated exclusively to tasks related to fire-fighting and prevention

Fire brigade **responsibilities and functions** must be assigned and proceduralised in the On-site Emergency Plan

Coordination required with the **external off-site** and the **second response** team that will participate in drills

Fire suppression (cf TS 03.2.2)

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Training (GS 1.19, chapter 6.4):

- Initial
- Continuous

Drills at regular intervals **not exceeding 3 months** (each member 2 drills per year)

Physical condition and aptitude assessed yearly by a competent person as required by IS-30 (art. 3.7.2) and GS 1.19 (art. 6.5), developed in specific CTI (NFPA 1582, CPAT)

Fire protection training all across the organization.

Promotion of the emergency preparedness program

- There is a unique section at the plant (FP and Emergency Management, FP&EM) in charge of fire protection together with the implementation of the Extensive Damage Mitigation Guidelines (EDMG).

- This section is responsible for:
  - All activities related to FP (supervision, maintenance and testing of FP systems…)
  - Maintaining the EDMG as well as the correct functionality and periodic testing of the related portable equipments (FLEX).
  - Maintaining of the Internal Emergency Plan and all the devices related to it, including drills execution.
  - Leadership of the of the Committee for Emergency Preparedness and Management.
  - Maintaining agreements with outside support organisations (civil and military)

- Having all these responsibilities together under the same section makes more visible the section and important the issues they are responsible for in front of the plant.

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Signaling of EDMG strategy equipment

- The FLEX equipment and plug&play connections used in post-Fukushima strategies are pink-coloured.
- This makes clear the aim of the equipment/connections and avoids possible misunderstanding/mistake in a highly stressing situation.

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Methods for determining suitable fire barriers

- General rule: fire-resistant barriers must be 3h FR under standard test (ASTM-E-119 or equivalent).
- Alternative configurations (IS-30, article 3.2.5):
  - 6m (20 ft) separation without intervening combustible or fire hazards + detection and automatic suppression in the area, or
  - 1h FR + detection and automatic suppression in the area
  - Other accepted by the regulator (exclusion of storage areas and/or fire risks, fire watches)

Fire damper inspection and monitoring:

- Fire dampers are required to be visually inspected every 18 months.
- Functional testing of fire dampers by actuating the fire damper tripping mechanism (fuse or electric) without the need to blow the fuse.
- Depending on the type of damper, a test was required every 18 or 24 months (Trox type) dampers or every 10 years, with 10 % per year, for louvre curtain fire dampers.

Ventilation management (cf TS 03.3.2)

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In Vandellòs NPP there are some louvre curtain type fire dampers that are exempted for the functional testing due to physical inaccessibility or radiological concerns.

Physical inaccessibility:

- Hatches to access the damper are not wide enough to perform the fire test in a safe way for the staff performing the test (prevention of occupational risks). There is not space enough to introduce both hands and the head to perform the test without a risk to the damper and to the personnel that has to perform the actuations required for the functional test procedure:

1. Remove the thermal fuse holding the fire damper with the other hand.
2. Being very careful about the risk of entrapment, liberate the fire damper for the centre (where the fuse is installed) letting it close with the action of the closing spring.
3. Verify the correct closure of the damper.
4. In case of satisfactory results, re-establish the fire damper to its normal condition taking especial care to the risk of entrapment.

Ventilation management (cf TS 03.3.2)

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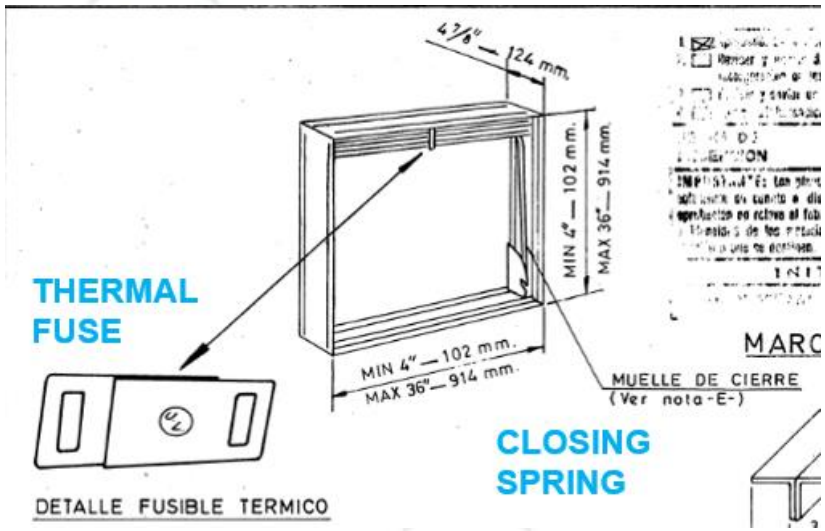


VANDELLÒS II NPP FIRE DAMPERS

COMPUERTA CORTAFUEGOS
TIPO: 319 ALV
RESISTENTE AL FUEGO 3 HORAS

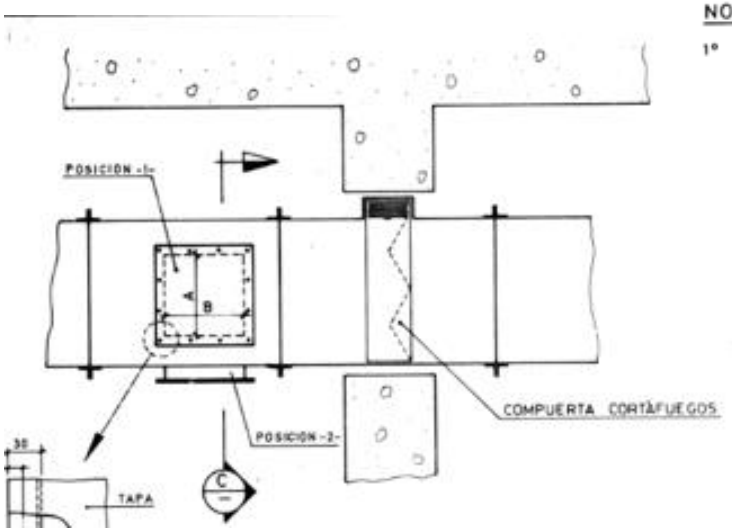
ANISA DIVISION NUCLEAR — LICENCIA — air balance inc

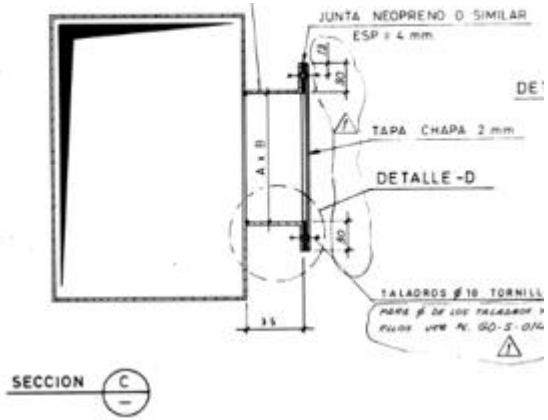
SUPPLIER — MANUFACTURER

DIMENSION A x B OF THE INSPECTION HATCHES WILL BE DETERMINED BY POSIBILITIES ON CONSTRUCTION

NOTAS

1º La dimensión (A x B) de las puertas de acceso y/o bocas de inspección se determinarán para cada caso en concreto segun las posibilidades de obra.





Ventilation management (cf TS 03.3.2)

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Photographs of an example of a fire damper accesible for visual inspection, but not for functional test

Ventilation management (cf TS 03.3.2)

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- The only alternative to grant access to perform the fire damper functional test is the conducts deinstallation, leading to long lasting impairments / non functionalities of the ventilation systems.

Radiological Concerns:

- Following ALARA recommendation, functional tests are not required for fire dampers in radiological zones level III or higher.

ZONE	MAXIMUM DOSE RATE (µSv / h)
I	5
II	25
III	150
IV	10.000
V	> 10.000

Ventilation management (cf TS 03.3.2)

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Justifications

- These fire dampers have been tested in origin, both factory testing and in the plant after installation.
- All of them have one or two closing springs that guarantee the proper closing of the damper and its fixation in closed position. This is considered a highly reliable design.
- The manufacturer does not recommend periodical testing, only periodical inspection to verify the fuse and general condition.
- All of them are visually inspected every 18 months to confirm acceptable condition. In case of physical inaccessibility for direct visual inspection, inspections are carried out using endoscopes.
- They are the same type than the ones that are tested, not having found any potential issue as a result of the functional tests performed.

STRENGTHS, WEAKNESSES AND LESSONS LEARNED

- Entry into force of **IS-30** has established **complete and systematic methodologies of analysis**, dealing with the concept of fire protection in an integral way.
- The requirement for **seismic FP systems** in operating power plants and the development of **flooding analyses covering both FP actuation and rupture** is an indication of the concern for the combination of seismic + fire and fire + flood events and their consideration by current regulations.
- Various activities carried out to ensure the performance of **fire barriers**.
- New innovative elements developed by the licensees relate to:
  - Integrated risk-informed FP management processes at some plants.
  - Carrying out scheduled and monitored fire watches using computerised tools.
- Cutting and welding work procedures, procedures for the control of combustible materials storages, procedures for periodic surveillance of fire resistant structures.
- The design modifications and improved procedures required to guarantee safe operation in the event of any postulated fire scenario, including **scenarios beyond the design basis**, have been implemented at the Spanish plants

STRENGTHS, WEAKNESSES AND LESSONS LEARNED (Contd.)

- It is desirable the participation in the development of the **operational experience databases (FIRE)** and incorporation of the lessons learned that may be derived from this database as an additional source to those already analysed.
- **Excessive dependence on American standards** that slows down the purchasing processes necessary to resolve non-functionalities and implement improvements relating to passive protection. To this respect, the CSN has recently issued a regulatory provision to accept non-US standards for the qualification testing of fire resistant barriers.

STRENGTHS, WEAKNESSES AND LESSONS LEARNED

- All Spanish NPPs are **audited by insurance company NEIL**, which issues recommendations concerning fire protection (installation of **flange protections** in high pressure oil systems to avoid spray fire in turbine building and in Vandellòs installation of **systems for collecting and draining oil and fire suppression water leaks** in turbine building oil systems)
- A process of **monitoring the inspection procedures for fire-resistant seals** at the different nuclear power plants has been in place.
- As a result, all ongoing/pending modifications in the NAR have already been implemented.

Analyses of adverse effects of water:

- Comprehensive analyses of flooding effects by FP actuation/pipe rupture (all NPPs)
- Effective flooding protection of critical equipment from harmful effect by firefighting water extinguishing system (Almaraz).

Conclusion

HOT WORKS


GESTIÓN DE PERMISOS DE TRABAJO CON RIESGO DE INCENDIO

GE-C1-02.07

Revisión: 17

Aplica: CNA ☒ CNT ☐

Uso del procedimiento: REFERENCIAL

¿Importante para la Seguridad? SI ☒ NO ☐


Iberdrola España

CENTRAL NUCLEAR DE COFRENTES

MANUAL DE PROTECCIÓN CONTRA INCENDIOS

TRABAJOS CON LLAMA ABIERTA, SOLDADURA Y CORTE

P.P.C.I./2.1.2.2

CSNC

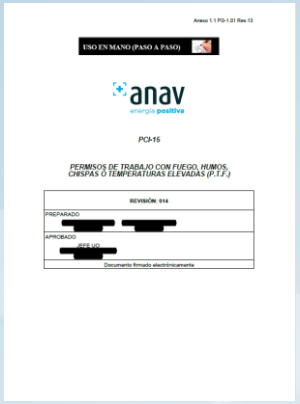
PREPARADO A. Castello Murillo 12/12/2023

REVISADO C. Gutierrez Esturillo 19/12/2023

GARCA J. Conesa Marín 21/12/2023

APROBADO C. Gutierrez Esturillo 28/12/2023

Internal Use


Anexo 1.1 PG-1.01 Rev.13

USO EN MANO (PASO A PASO)

anav energía positiva

PCI-15

PERMISOS DE TRABAJO CON FUEGO, HUMOS, CHISPAS O TEMPERATURAS ELEVADAS (P.T.F.)

REVISIÓN: 014

PREPARADO [redacted]

APROBADO [redacted]

Documento firmado electrónicamente

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Detailed arrangements for the management of hot works

- There is a procedure to define the process to follow in work with open flames, welding, cutting, work that could activate the Fire Detection System due to the generation of dust, water vapor or smoke from vehicles and work with open flames, welding and cutting, which are to be carried out in areas with risk of explosive atmospheres.
- The procedure establishes the functions and responsibilities of the unit heads, the FP organization, the Control Room and all the people who carry out the work.
- Before starting the work, the FP unit is notified. Through the “PCI Permit Management System”, the work and the area in which it is to be carried out are studied, and the necessary safety requirements are determined, as well as the frequency of preventive surveillance to be carried out, according to the importance of the area.
- Then it must be authorized by the Control Room.
- According to the NFPA-51B standard, SEPCI will carry out an additional review of the area (½ hour surveillance after the permit is closed), to observe that there is no latent risk in the area.
- The procedure details the areas with special conditions, MRO areas, ATEX zone classification and the forms to be filled out.

Conclusion

HOT WORKS

Cofrentes NPP

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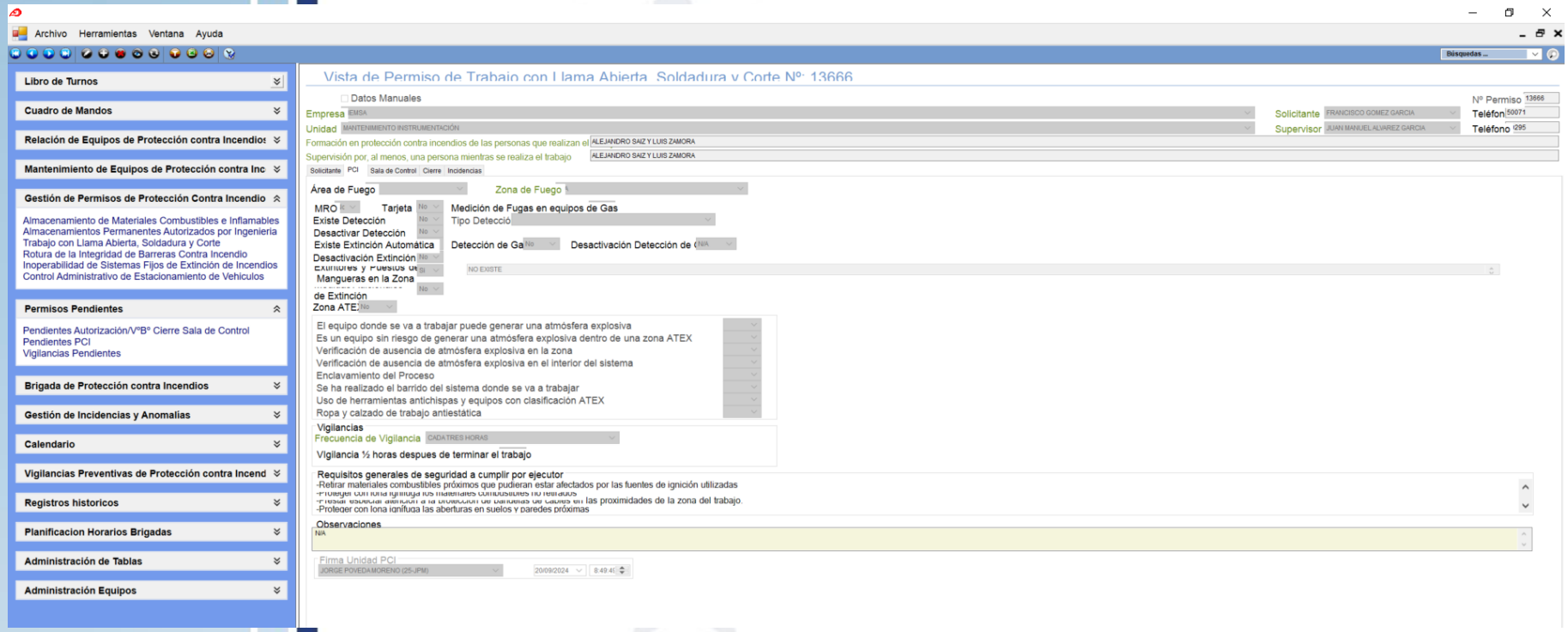

Example Cofrentes NPP

Conclusion

TS 01.3 and TS 04

Vandellòs 2 NPP

European Nuclear Safety Regulators Group

- Implementation of new provisions as the result of lessons learnt from conventional industry

In the Q&A the following examples were collected:

Operating Experience is shared with the external brigades, so lessons learnt from conventional industry are taken into account.

For instance, after an experience from Firefighters of the *Generalitat de Catalunya* relating a firefighter trapped in a garage that was missed until several hours later, Vandellòs II NPP stablished a system called CACE "control of access and control of equipment" in firefight procedure and in training, to keep always under control the firefighters involved and their breathing apparatus.

This exchange of operating experience exchange is taking place during the welcome meeting for the combined internal and external brigades training drills performed at the nuclear site 4 times a year and also in the closing meeting for the combined announced drill performed once a year.

Operating Experience is shared with the other Spanish NPP at the annual meeting. Working groups are stablished when a specific aspect is identified.

The group has lately studied conventional fire experience to stablish general guidance for actuation in case of a fire in lithium ion battery electric vehicles, consisting mainly of:

- usage of specific confining blankets; and
- separating the burning vehicle to avoid danger to plant equipment or other vehicles.

Vandellòs II NPP has purchased the specific blankets and is currently training the fire brigade personnel.

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2. Fuel Fabrication Facility

Fire safety analysis (FSA) (cf TS 02.3)

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- Fire Hazard Analysis:
  - Required by industrial regulations,
  - Objective: Evaluate the risk of fire, taking into consideration
    - The calculation of intrinsic risk
    - Constructive characteristics
    - The fire protection existing means.
    - The identification of applicable prevention and protection measures.
- Explosion risk analysis (technical guide, RD 681/2008 of 12 June):
  - Probability of explosion (presence of ignition sources + explosion atmospheres): from unlikely to frequent
  - Level of explosion risk (probability of explosion + severity of consequences): from tolerable to untolerable

Fire safety analysis (FSA) (cf TS 02.3)

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- Deterministic accident analysis:
  - Assess Radiological consequences (fraction of dose limit to public):
    - Level I (doses of less than 0.015 mSv)
    - Level II (doses of less than 0.15 mSv)
    - Level III (doses at the boundary of the restricted area of less than 5 mSv)
  - As a result of the analyses, all fires postulated can only lead to scenarios of levels I and II.

Fire safety analysis (FSA) (cf TS 02.3)

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- Integrated Safety Assessment (ISA)
  - NUREG-1513
  - Systematic examination of the processes carried out at the facility.
  - Aimed at identifying the credible causes that may lead to every event and its consequences.
  - Considers normal operating conditions and any credible deviations from these conditions, including start-up, shutdown, maintenance, etc.
  - Results: For sequences identified with unacceptable or moderate unmitigated risk, **additional controls** in the process need to be defined and implemented **to minimise the probability of occurrence or to reduce the severity** of the sequence

Compartmentation (cf TS 03.3.1)

- Constructive elements:
  - The **walls of the fire sectors corresponding to the Manufacturing and Auxiliary buildings** are constructed with materials of variable **fire resistance between 240 and 120 minutes as a minimum**, which is much longer than the time required according to the intrinsic risk level.
  - The walls of the fire sectors corresponding to the **Generator Rooms and Fire Pump** Rooms have a fire resistance of at least **180 minutes**.
  - Electrical power distribution has been carried out with **non-flame propagating cable**, in accordance with R.D. 2267/2004 [74].
- Penetrations:
  - The **fire doors** for access between the different sectors have a door-closing maintenance capability (closing spring). Their fire resistance ranges from **60 to 180 minutes**.
  - The **process openings** in the walls between sectors are fitted with automatic fire dampers, with **gravity closing and fuse element**. Its fire resistance is **120 minutes**.
  - The **ventilation ducts in the ceramic area** connecting different sectors are fitted with fire dampers with automatic mechanical closing by spring and fuse. Its fire resistance is **120 minutes**.
- Others:
  - The secondary filters of the extraction system, due to their importance in controlling emissions to the environment, are protected by **fire dampers of 120 minutes** fire resistance, located between the filters and the engine unit.

Compartmentation (cf TS 03.3.1)

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Ventilation and HVAC

- The Ventilation and Air Conditioning System used **for air treatment in the Ceramics Area** where there is a risk of environmental radiological contamination is considered a safety system. The functions of the safety system are as follows:
  - Keep the **Ceramic Zone in depression** with the outside in order to prevent the spread of contamination.
  - Establish correct **air depression and air flow values in glove box cabinets and hoods** where radioactive material is handled so as to minimise the risk of contamination of people and materials.
  - Maintain air circulation, filtration and renewal in the areas to obtain clean ambient air.
  - **Absolute filtration (HEPA filters)** of all the air coming from this Zone to the outside.

- To guarantee the proper functioning of the extraction and air conditioning systems, the **system is permanently monitored,** generating alarms and warnings in the event of filter clogging, and in case of changes in flow rates and pressures in the working areas and cabins.

Conclusion

TS 01.3 and TS 04

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IMPROVEMENTS:

- Modifications to comply with ATEX regulations.
- Refurbishment of the gas storage area and control panel for the modernisation of all instrumentation.
- Modifications derived from the ISA analysis.
- Modification of the route of the gas pipes outside the building and replacement of propane in the sintering and densification furnaces to minimise risks
- Modification on the location of FHC to improve the handling and utilisation possibilities.
- Modernisation of the FP vehicle and detection and suppression systems
- Seismic- water supply to the fire protection
- New cabin temperature probes, to replace those located in some cabins in the ceramic area with certified detectors for Fire Protection.
- Pressure and flow switch control stations for replacement and redesign.
- Replacement of the fire control panel.
- Replacement of the diesel pump of the fire protection system.
- Revision of buried carbon steel connections between the main loop and the control stations in Fire Water Supply System.
- Reviews of internal procedures governing activities such as the treatment of penetrations and fire dampers.
- Design modifications to install optical and acoustic stop signals at drum crossings.

Conclusion

TS 01.3 and TS 04

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Lessons learned.

- **Event combination analyses** have led to design **improvements** such as the re-routing of the hydrogen lines and the construction of the seismic water tank for FP, both of which are considered a strength in firefighting.
- Several **incidents at facility and other facilities** led to improvements:
  - Reviews of **internal procedures** governing activities such as the treatment of **penetrations and fire dampers**
  - **Interlock the H2 line pressure** switch and the gas shut-off valve
  - Installation of an industrial type hoover with specified requirements in the area of the active scanner and replacement of the vacuum cleaners for the collection of zircalloy
  - Modification of the positioning of duct detectors
  - Purchase of plasma cutting equipment in the ceramic zone;
  - Reviews of internal procedures
  - Design modifications on the FP systems.

Conclusion

TS 01.3 and TS 04

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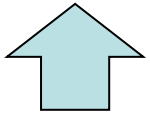
STRENGTHS and WEAKNESSES

- The conclusions of the **Integrated Safety Analysis (ISA)** and the Accident Analysis included in the Safety Study show that the risk analysis carried out in the installation has **allowed the correct implementation of fire protection in the installation**. ISA has enabled an integrated and comparative analysis of the different risks in the installation and the identification of the most important basic safety elements.
- Although training provided in relation to fire prevention in work practices is considered adequate, this programme should be updated to include the contents of training and prevention actions.
- Fire regulations for this type of installation are strongly based on industrial regulations and the prevention of occupational hazards, although it is necessary to take into account the differentiating aspects of radiological risks.

- The licensee will be required to analyse the standards available for installations of the same type, leading to the adoption of a FP program involving the integrated management of fire risks and the factors involved in fire protection.



- Good practice identified in TW: radiological consequences of fires.

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Thank you very much for your attention