



**THE MANAGEMENT OF
RADIOGRAPHIC CONTROLS ON THE
CONSTRUCTION SITE OF THE
FLAMANVILLE 3 EPR REACTOR**

ISOE INTERNATIONAL SYMPOSIUM

Brussels, 1 - 3 June 2016

FRANCK VEYSSIERE (EDF FLAMANVILLE 3 RP EXPERT)

STÉPHANE LELONG (EDF FLAMANVILLE 3 RP AND SAFETY MANAGER)

GONZAGUE ABELA (EDF NUCLEAR ENGINEERING AND NEW NUCLEAR DIRECTION)





- CONTEXT AND CHARACTERISTICS
- PREPARATION : ORGANISATION & RESPONSIBILITIES
- REALIZATION & EXPERIENCE FEEDBACK





CONTEXT AND CHARACTERISTICS

Flamanville 3 is the largest construction site in Europe :

- Civil Work completed
- 4000 workers on site
- Radiographic Non Destructive Testing : 46 000 in 2015
- EPR site / Operating Units = same RP standards

SAFETY FIRST : Lost Time Injury rate = 2.1 in 2016
(French calculation, with all events on site)

Specificities and differences from operating Units:

- ☞ Some closing are not available
- ☞ No EPD on nuclear island
- ☞ No gamma detection installed
- ☞ Many provisional access
- ☞ Lower lighting
- ☞ New EPR design, unknown by workers
- ☞ Neutron and heavy doors in reactor building and baffles
- ☞ Till 16 Radio NDT teams simultaneously on site

CONTEXT AND CHARACTERISTICS

1st RP principle :

Justification included in the studies

Some more tests can be

- requested by the Authority
- needed by the welding quality
(according to results of each welder)





- CONTEXT AND CHARACTERISTICS
- PREPARATION : ORGANISATION & RESPONSIBILITIES
- REALIZATION & EXPERIENCE FEEDBACK



PREPARATION : ORGANISATION & RESPONSIBILITIES

Source Arrival

As it arrives on site,

- The administrative status of the source is checked
- The source is under EDF control



Sources Storage

The owner need a Radiographic Work Permit delivered by EDF to take his source out of the locked room.



PREPARATION : ORGANISATION & RESPONSIBILITIES


The NDT Radiograph Company

- Weldings identification
- Irradiation duration
- Nuclide used (^{60}Co , ^{192}Ir , ^{75}Se)
- Source activity (from 20Ci to 400Ci)
- Film Quality



NDT Radiograph Company

- Where
- When
- Beaconing map
- Emergency procedure (source blocking,)
- Dose prevision...

EDF Aménagement de Flamanville 3		IRRA 2014 CTE/27	
Analyse des risques associée au permis de contrôle radiographique N°			
Désignation de l'intervention :			
Tir radiographique souterrain PI IRRA CTE 14-001 rév. 1B			
			
1 point		Valeur de 1	
Résumé			
Éléments de la feuille : sur 1 niveau	1	0	0
de 2 à 3 niveaux	2	0	0
plus de 3 niveaux	0	0	0
Nombre accès dans la zone de tir : de 1 à 5	1	0	0
de 6 à 10	0	0	0
supérieur à 10	0	0	0
Configuration des voies d'évacuation (déplacement)	2	0	0
		13	
Environnement			
Zone contrôlée	1	0	0
Hors zone contrôlée	0	0	0
Fiabilité des plans de la feuille : Plan des locaux non fiabilité	3	0	0
Plan de la feuille non fiabilité	3	0	0
Régime	3	0	0
Accessoire, câble(s), trépan, passage hydraulique, coupe file, ...)	2	0	0
		54	
Source			
Débit de dose de la source à 1 m : < 100 mSv/h	3	0	0
100 mSv/h < DOG < 300 mSv/h	7	0	0
> 300 mSv/h	0	0	0
		7	
Caractéristiques du contrôle			
Temps d'exposition (filère d'ajustement x (s) expo pour un contrôle) : < 30 min	1	0	0
supérieur à 30 min	3	0	0
Position source : inférieure tangente	0	0	0
Entraîne (cable, pénétrant, ellipse)	3	0	0
Sans câble(s) (tir extérieur tangente)	0	0	0
		0	
Co-activité			
Horaires de tir : Hors horaires de référence site (NRT)	2	0	0
Horaires de référence site (JOUR)	6	0	0
Inférieure au voisinage de la zone d'opération	0	0	0
		0	
Contexte			
Prévisions : Equipe de tir identifiable comme primo-intervenant	3	0	0
Classification du tir : Tir de week-end	0	0	0
Tir Non prévu à J-42H	0	0	0
Tir déclassé plus d'une fois	0	0	0
		0	
TOTAL		45	
TOTAL sur 100		54,3	
Possibilité de "boire" le classement en tir à RP par la cote ou justification			
Valeur souli permettant de classer le tir en "tir à risques particuliers"			
Si le poids sur 100 est supérieur ou égal à cette valeur, le tir est classé "tir à risques particuliers"			
Attaque d'urgence incident de source : C/NON		X/XX	
		Hélicoptère	
Tirs à Risques particuliers		<input type="button" value="OUI"/> <input type="button" value="NON"/>	
		Date : 24/02/2018	
		GOURMETT M.	
		C. (coordonnées, téléphone, etc.)	
		Vies	

PREPARATION : ORGANISATION & RESPONSIBILITIES

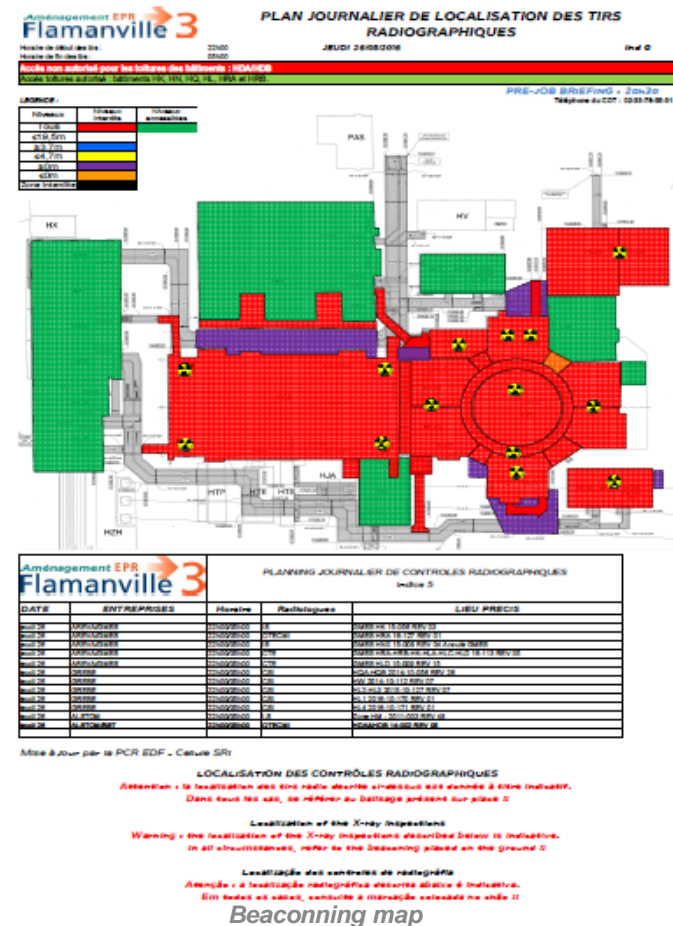
EDF Flamanville 3

- ☞ Coordination / interactions between:
 - ☞ Other testing operations
 - ☞ Access
- ☞ Shielding supply (lead blankets)
- ☞ Beaconsing maps
- ☞ Radiographic Work Permit : checking and validation **By site RPM**

Site manager RWP approval

Unit radiographic survey map for each night

➔ During night shift + Week end : only Radiographic control : no other activity



PREPARATION : ORGANISATION & RESPONSIBILITIES

Site workers
information :
for pedestrians
and drivers



PREPARATION : ORGANISATION & RESPONSIBILITIES

Radiograph Company + EDF Flamanville 3

- ➡ Beaconing verification on the field
- ➡ Safe zone (low radiation area) identification
- ➡ Access and exits (scaffolding)
- ➡ Shieldings position
- ➡ Daily planning meeting (at 2 pm)



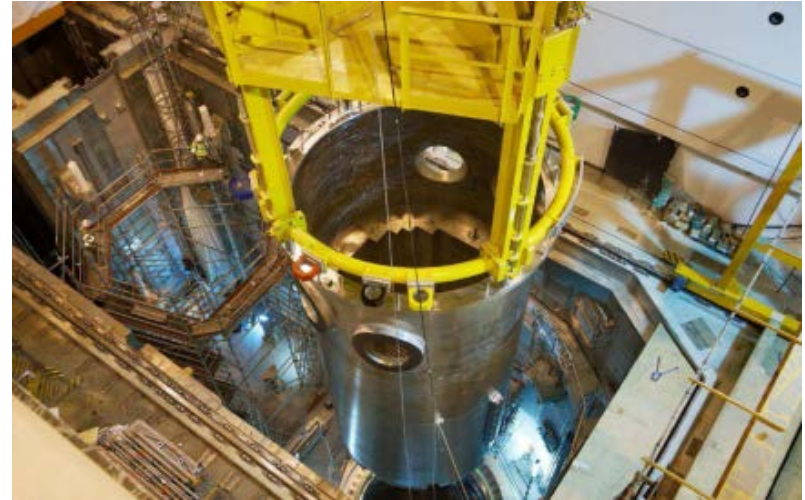


- CONTEXT AND CHARACTERISTICS
- PREPARATION : ORGANISATION & RESPONSIBILITIES
- REALIZATION & EXPERIENCE FEEDBACK



REALIZATION & EXPERIENCE FEEDBACK

- ➡ Pre job briefing meeting at 8:30
- ➡ Animation by EDF Coordinator
- ➡ All the Radiography crews
- ➡ Supervisors (6 to 10 people : EDF RP contractor)



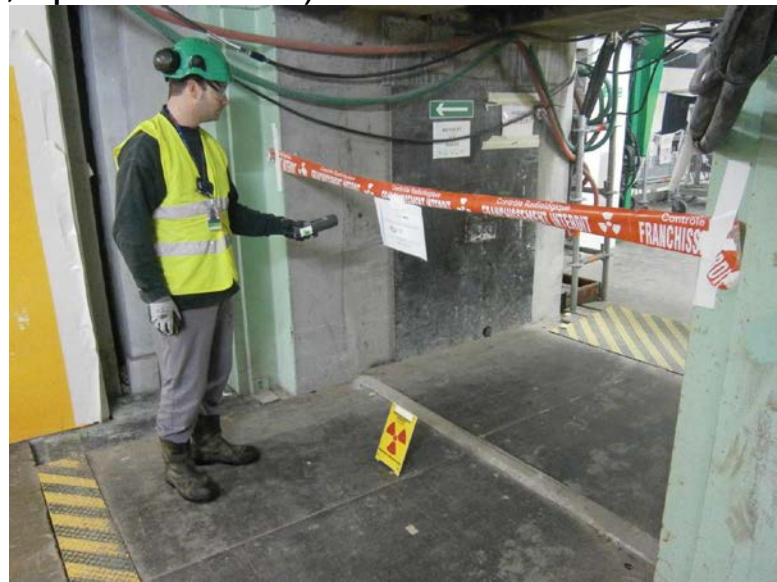
REALIZATION & EXPERIENCE FEEDBACK

On field

- 1st “General information call” before beaoning installation (9 *pm*)
- beaoning installation + area evacuation checking (Radiography crew)
- beaoning verification + area evacuation checking (RP Crew)
- If risk analysis Level > 54 → RP supervisor checking before source ejection.
- 2nd Audio “General information call” before source ejection
- source ejection
- Dose rate measurement / verification on beaoning level (7,5 μ Sv/h = max)
- Films reading during night shift

End of controls (5 *am*)

- Source back to lockers
- 3rd Audio “General information call” end of controls



REALIZATION & EXPERIENCE FEEDBACK

- No unplanned dose from the site work beginning.
- *All procedure deviation → “Significant Event” declaration to the Authority Body*
- Continuous improvement process
- EDF innovations : specific EDF RP tools “sentinelle”
- EDF standards : same training level requested for Radiographer “help” and radiographer
- Weldings identification confirmation “just before” control by EDF supervisor
- EDF and contractors keep the same radiographers crews
- Source blocking and emergency response exercises
- Information of site other workers with mock-up

On progress:

- More ^{75}Se tests
- Planning optimization
- Access control by 3D optique captor





**< THANK YOU FOR YOUR ATTENTION
QUESTIONS?**