

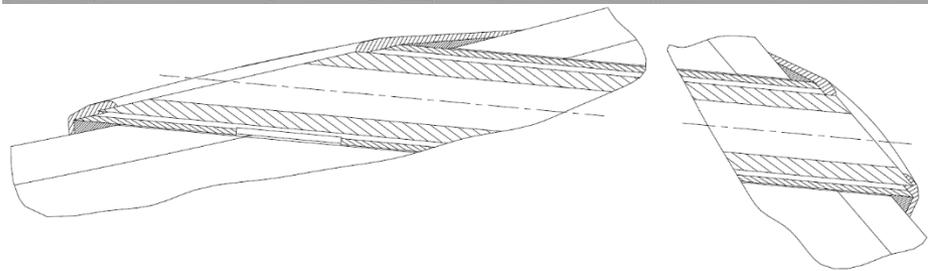


BLAYAIS NPP (FRANCE) DRAIN PIPE EVENT

ISOE 2021

DIPDE

DIVISION DE L'INGÉNIERIE DU PARC,
DE LA DÉCONSTRUCTION ET DE
L'ENVIRONNEMENT

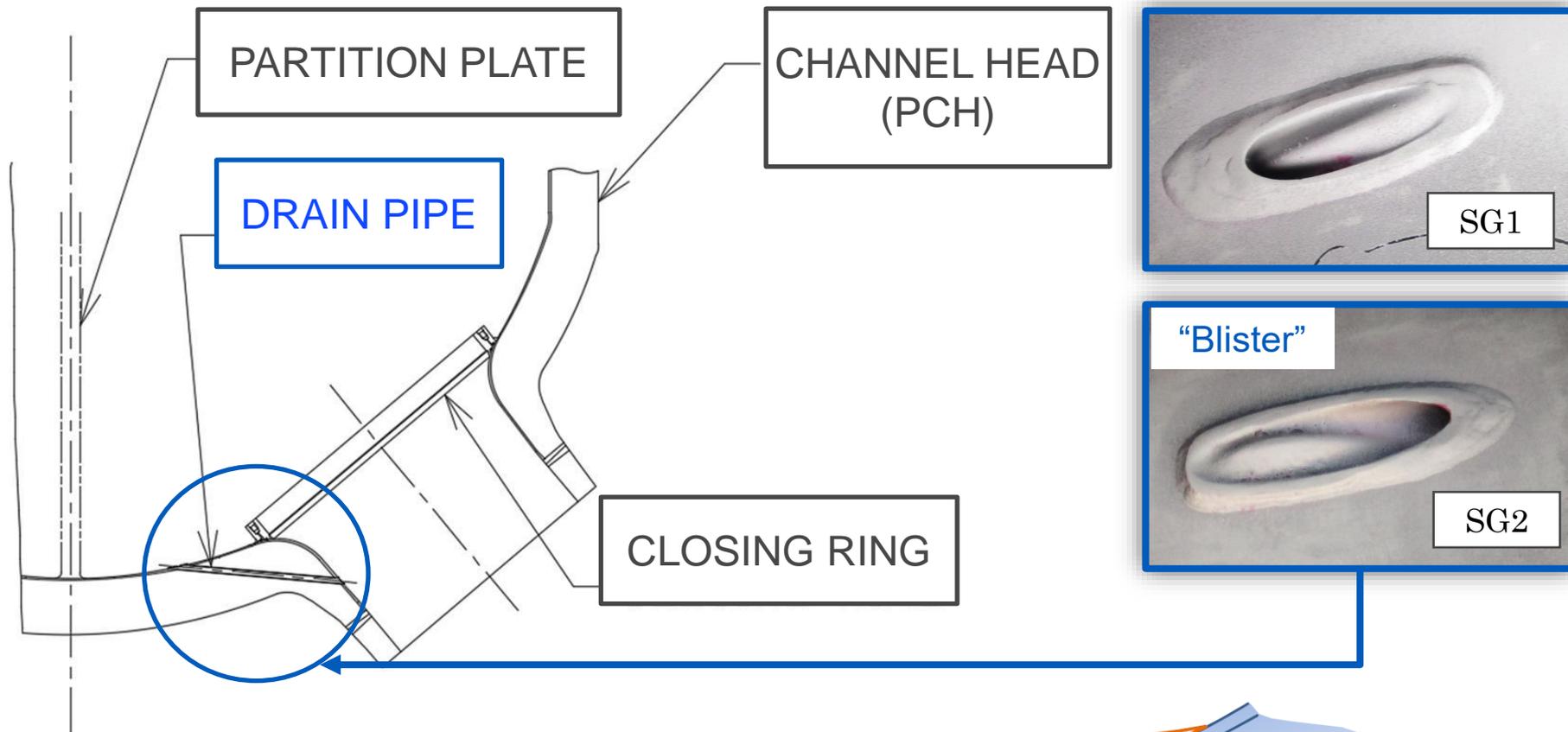


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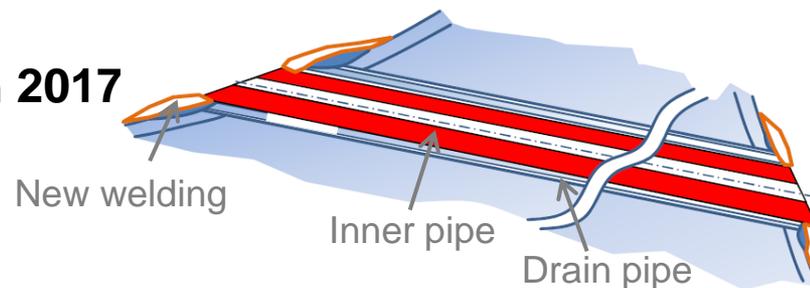
CONTEXT

- In 2015, important deformations observed of the drain pipes of BLAYAIS 2 SGs

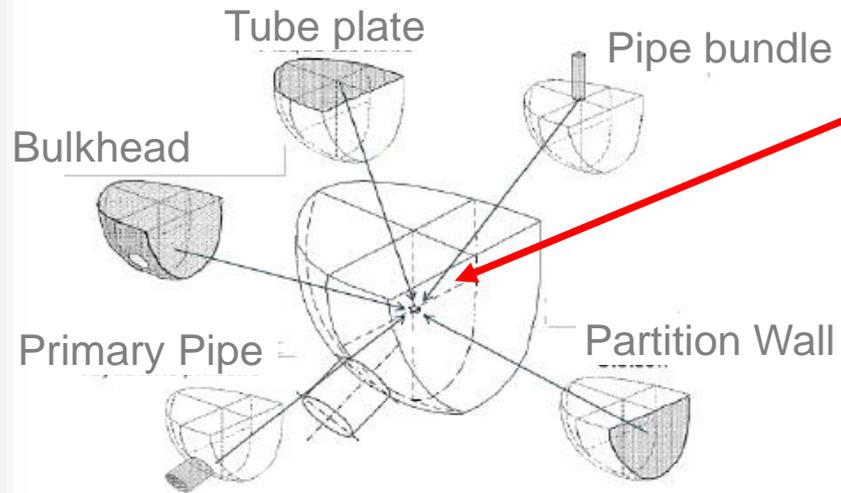
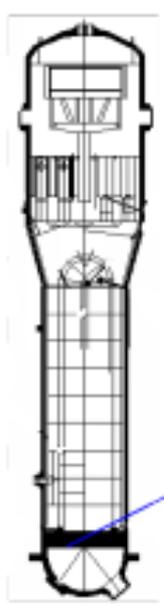


- The blister observed in 2015 had reached in 2017

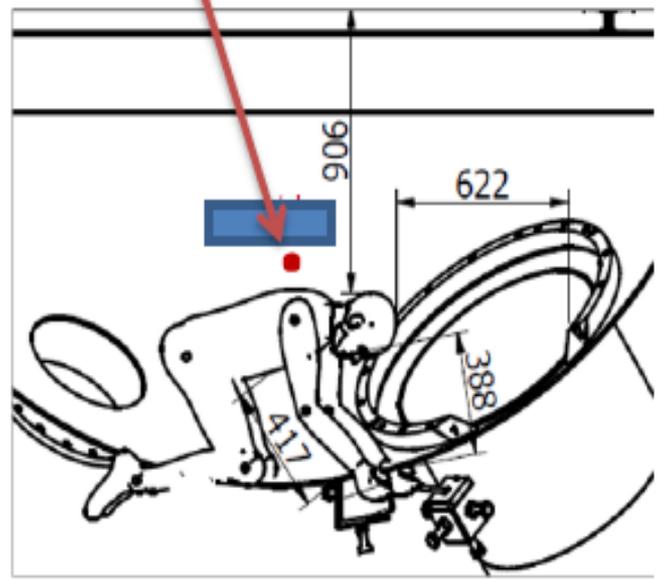
→ Décision to repair in 2018.



WORKSTATION : SOURCES CONTRIBUTIONS



Surrounding Dose rate



Channel head side work position

	EDF %
Total Tube plate	50
Total Bulkhead	28
Total Channel head	22
Total Primary piping	/

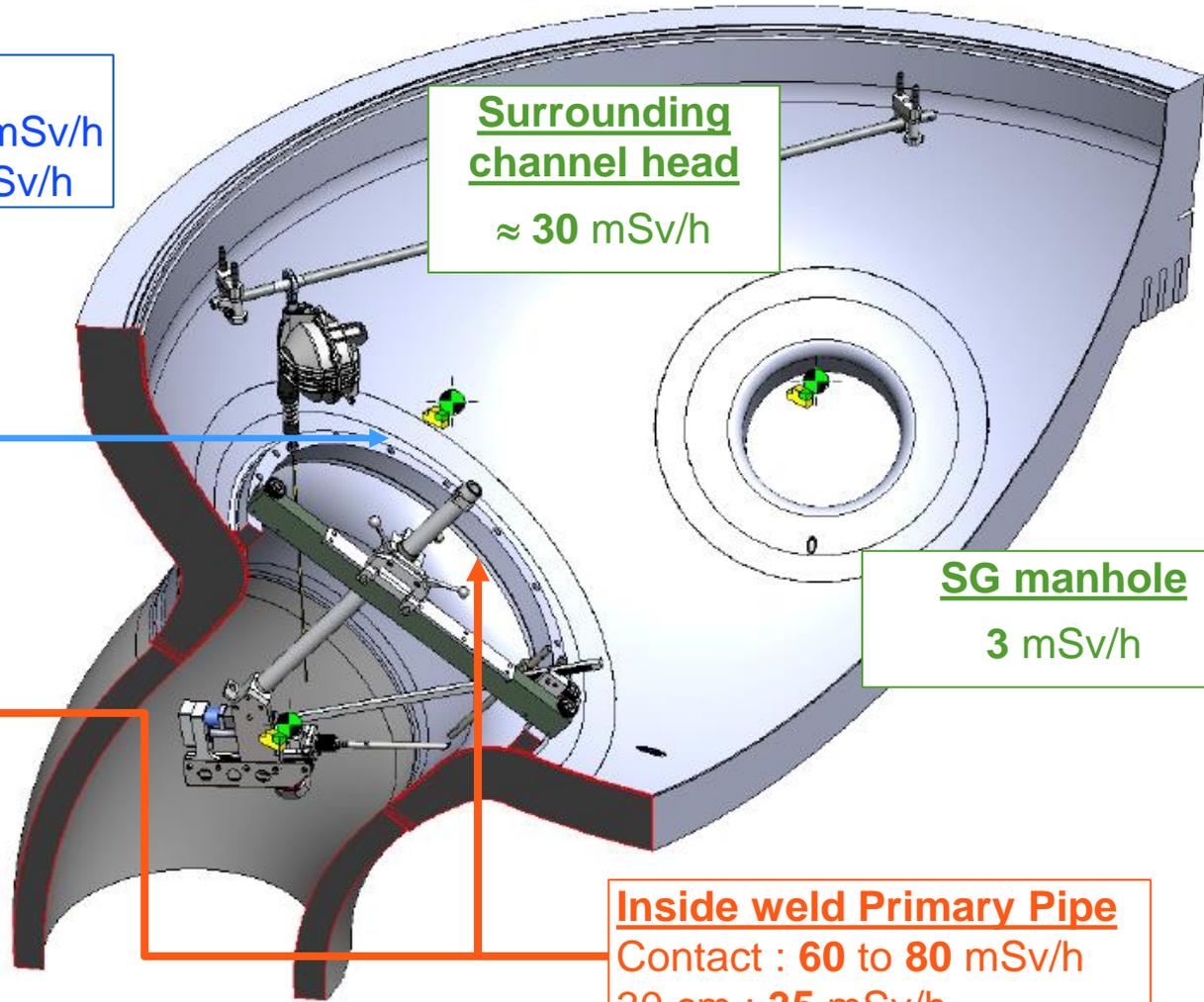
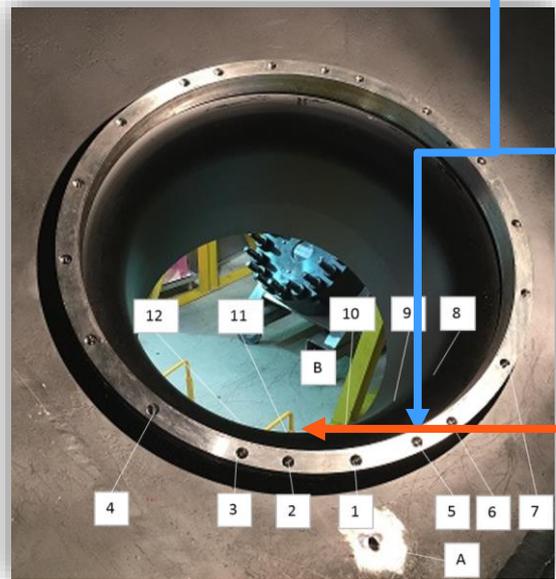
- The reference point called an surrounding point, located in the middle of the radius of the sphere, is in the perpendicular plane to the channel head bulkhead.
- Concerning the pipe bundle, the calculations show that only the first 15cm contribute to channel heads inner DER



RADIOLOGICAL CONTEXT

▪ Radiological context : Dose rates

Closing Ring
Contact : 30 to 60 mSv/h
20 cm : 20 to 35 mSv/h



Surrounding channel head
≈ 30 mSv/h

SG manhole
3 mSv/h

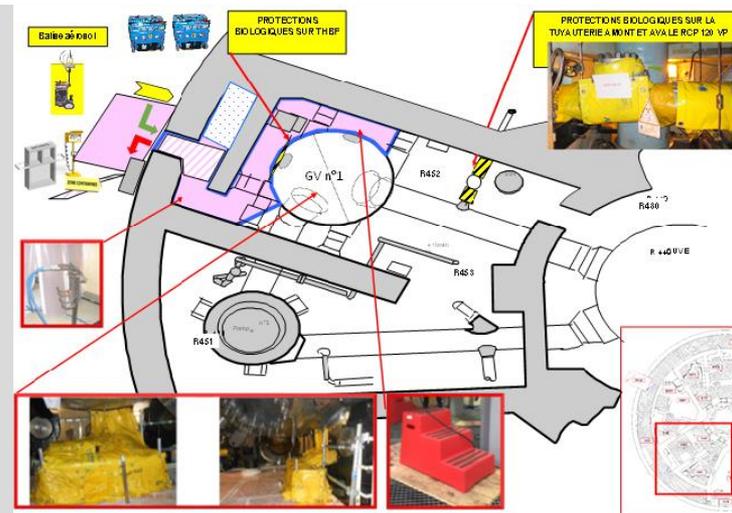
Inside weld Primary Pipe
Contact : 60 to 80 mSv/h
30 cm : 35 mSv/h

OPTIMISATIONS TO REDUCE THE DOSE

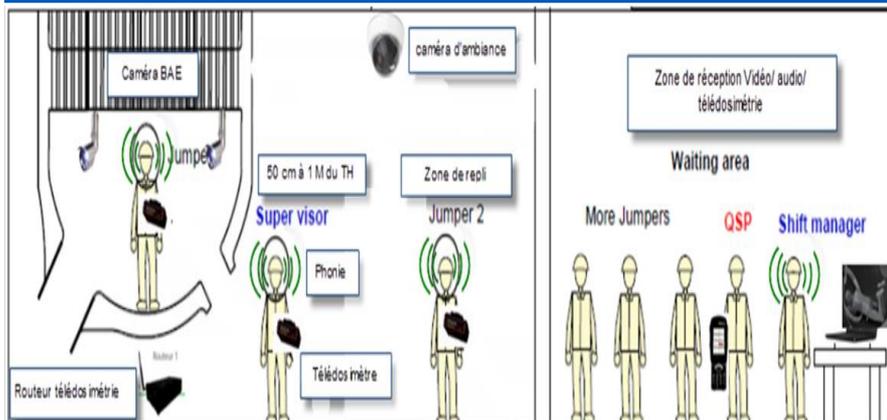
Training in a PCH mock-up



Biological shieldings



Follow-up methods



Studied but not selected optimisations

- Removal of an irradiant element
- Immersion of the circuits
- Decontamination process
- Biological shielding sarcophagus

HOT SPOTS OPTIMISATIONS

■ Decontamination of Hot Spots (cleaning wipe)

- Dosimetric cost : $\approx 0,87$ mSv
- Dosimetric gain : $\approx 3,4$ H.mSv

■ Design of biological shielding in T-FLEX

- Dosimetric cost : $\approx 0,35$ mSv
- Dosimetric gain : $\approx 3,3$ H.mSv

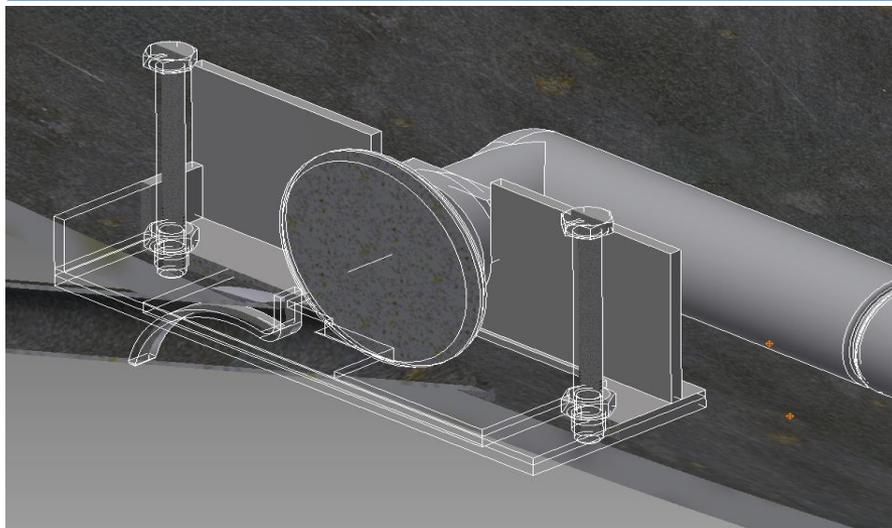
Measurements	DED (mSv/h)
Before optimization	[60 – 80]
After decontamination	[40 – 55]
After shielding	[23 – 30]



SPECIFIC TOOLS - AUTOMATISATION

- Two specific tools have been designed depending of the size of the blister

Little or no evolution of the size of the blister

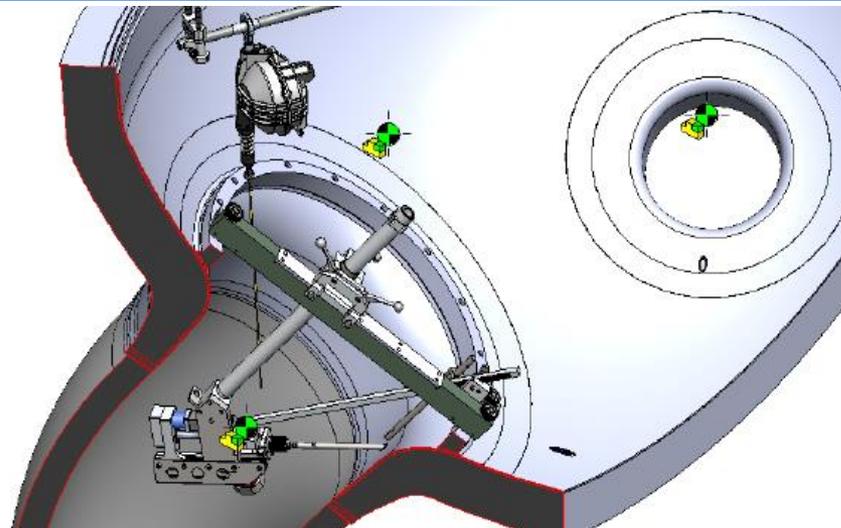


Dosimetric cost ≈ 3 H.mSv

Risk : limited use in the case of an significative evolution of the deformation, increase of the number of the jumps if difficulty during the process, increase of time inside the channel head : stress, confined nature of the work space, wearing of a ventilated hermetic suit

Advantage : simplicity and speed installation

Significative evolution of the size of the blister



Dosimetric cost ≈ 5 H.mSv

Risk : production of irradiant shaving, dysfunction risk, 4 jumps for installation and 2 jumps for removal

Advantage : control of the dosimetric target in case of deformed evolutions

WHAT SUIT TO GO INTO THE CHANNEL HEAD



Hi **Gilles** !
Nice suit to go to the
hotspot !



Hi **Julien** !
As usual, contamination
proof suit, hermetic and
ventilated.
And you?

I, **specific suit for welding** :

- *Fire proof suit*
- *Over boots*
- *Over suit*
- *Double layered paper hood*
- *Nitril welder gloves*
- *Isolating ventilated mask*

And what about
the **STD**?

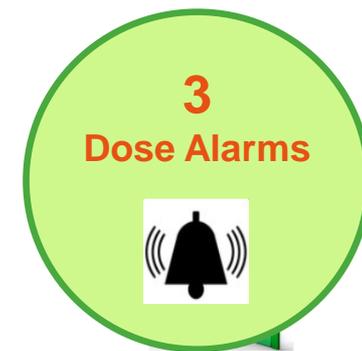
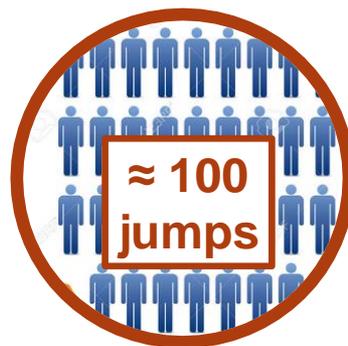
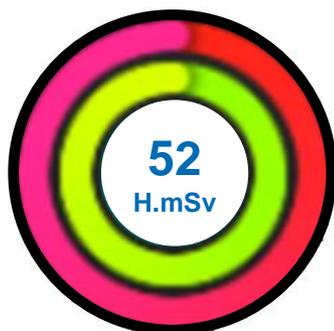
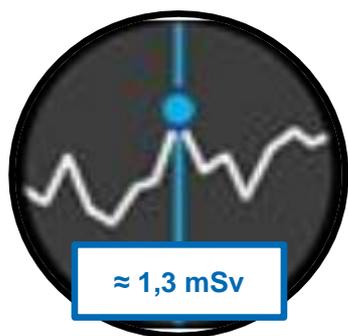
The **Source Term Domination**?
I'm confident. My technical gesture
will be succed and no
contamination risk !

Fine, it's my
round ! A little
dose?

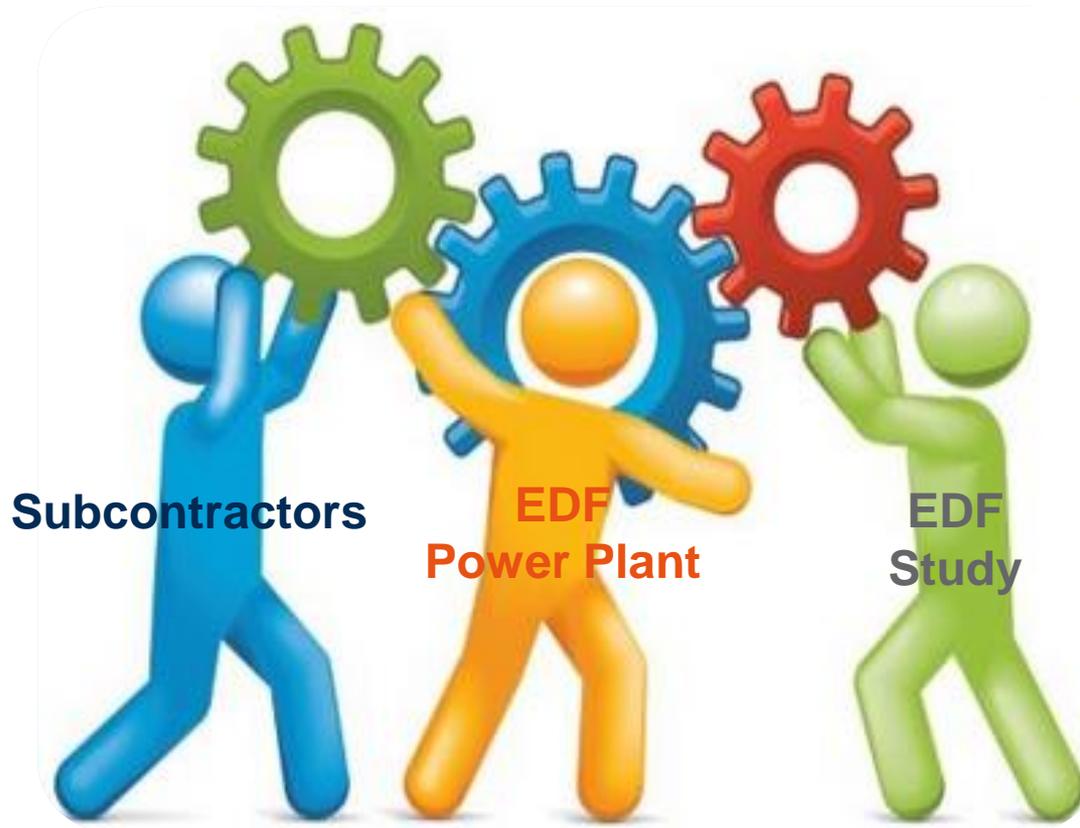
RADIATION PROTECTION SUCCESS

DRAIN PIPE INTERVENTION	Initial Dose (Person.mSv)	Actualised Dose * (Person.mSv)	Realized Dose (Person.mSv)	Deviation Realized / Actualised (%)
SG1	32,7	26,8	21,2	-20,9%
SG2	42,7	35,5	30,5	-14,0%
Total	75,3	62,3	51,7	-17,0%

* The actualized dose is estimated dose with DER measured at the beginning of the intervention



Collaborative ALARA working group



- Preparation within one year
- Two ALARA Comitees and five ALARA working groups
- Common safety / RP approach

OTHER GOOD PRACTICES

Workers Coaching



Safe zone



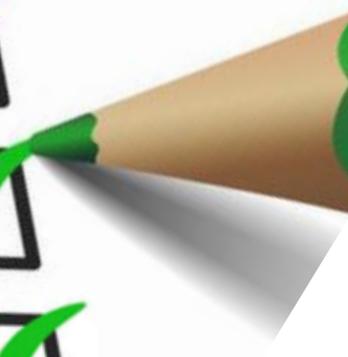
Precise DER Cartography



Biological Suspended screen



Training videos



Containment Airlock for training



Detailed breakdown operation



Anticipation of hasards



« S » hooks for air supply



Specific suit for welders



Phonic + video + teledosimétry



Additional « T-FLEX » shield

Expect two RP supervisors

Dressing/undressing activities

Slippery conditions inside PCH

Teledosimetry signal

Emergency electrical power supply