



QUALITY AUDIT AND QUALITY IMPROVEMENT PLAN at AREVA NP Le Creusot forging facility

London - September 12th, 2017



AREVA NP Creusot Forge

RPV Shell



Core plate



RCP casing



Monobloc closure head



- ▶ 220 people
- ▶ 2 presses (9000T and 11300T)
- ▶ 14 heat treatment furnaces
- ▶ 27 CNC machines

SG primary head



Elbow

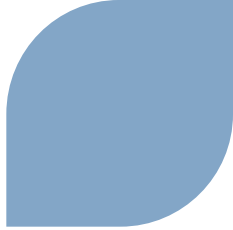


Cold leg



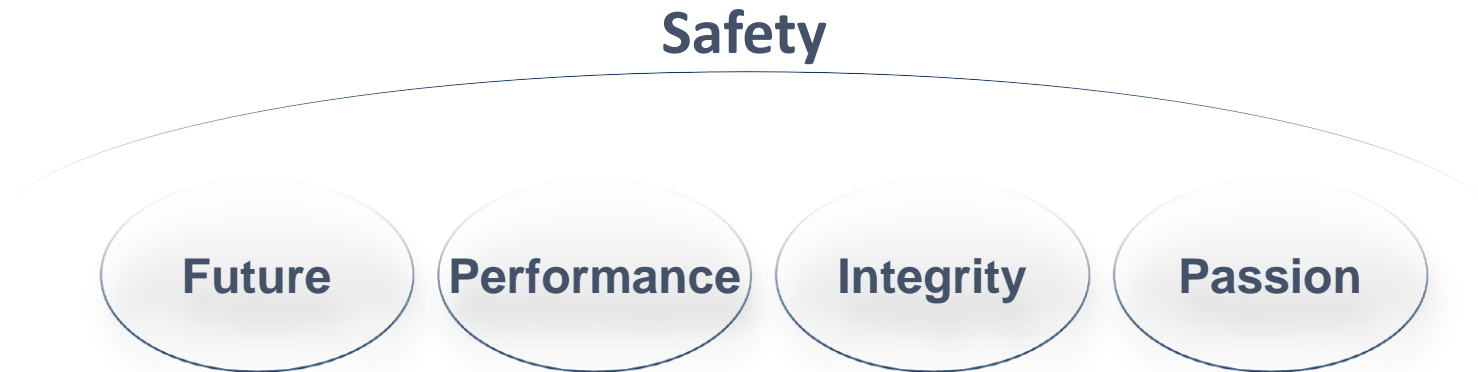
Hot leg





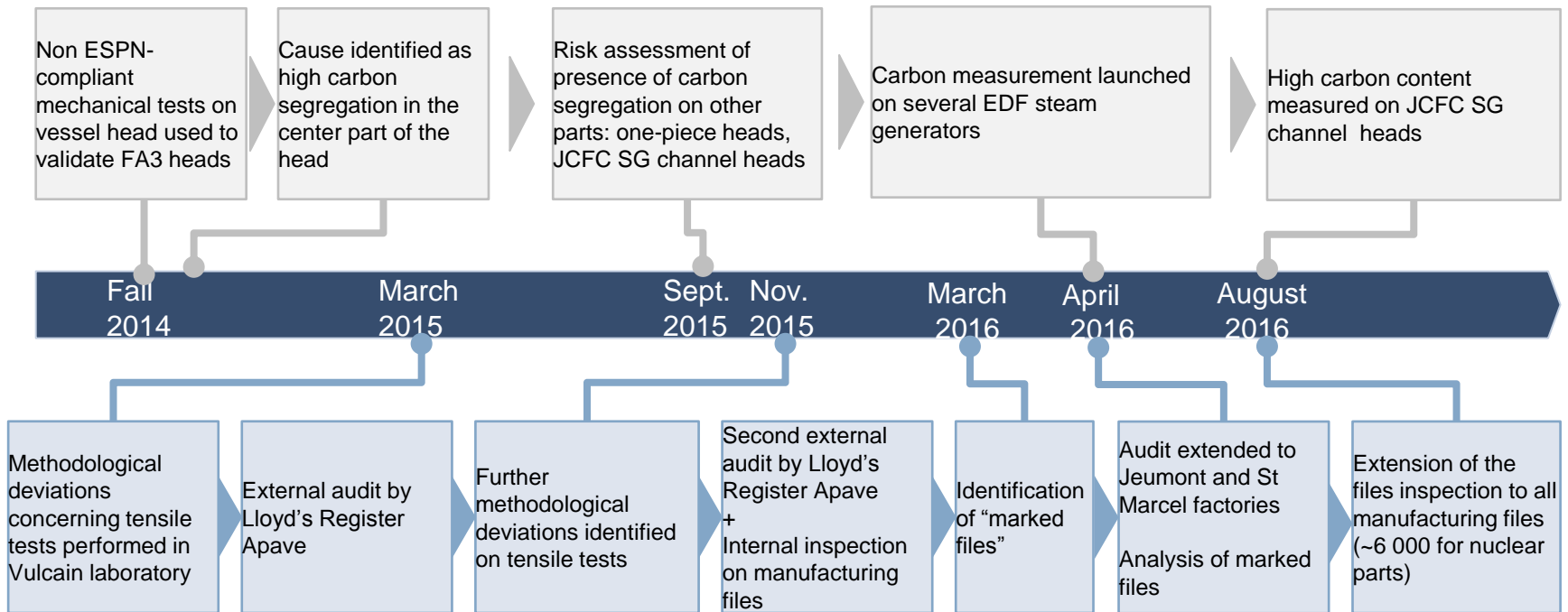
High-performing people and technologies for safe and competitive nuclear plants worldwide

VALUES



Creusot (and JCFC) quality topics timeline

1 Carbon segregation



2 Tensile tests

3 Deviant QA practices

Past manufacturing files review status

Context

- ▶ **In 2015, AREVA NP initiated an exhaustive control of its quality process on the equipment produced in its manufacturing site of Creusot Forge**
 - ◆ Through this review, some inconsistencies have been detected in the manufacturing tracking records
 - ◆ These inconsistencies are mainly related to the presence of “marked files” in the manufacturing archives

- ▶ **Consequently, AREVA NP decided to check all the manufacturing records archives to identify any marked file over around ~9000 files since 1965**

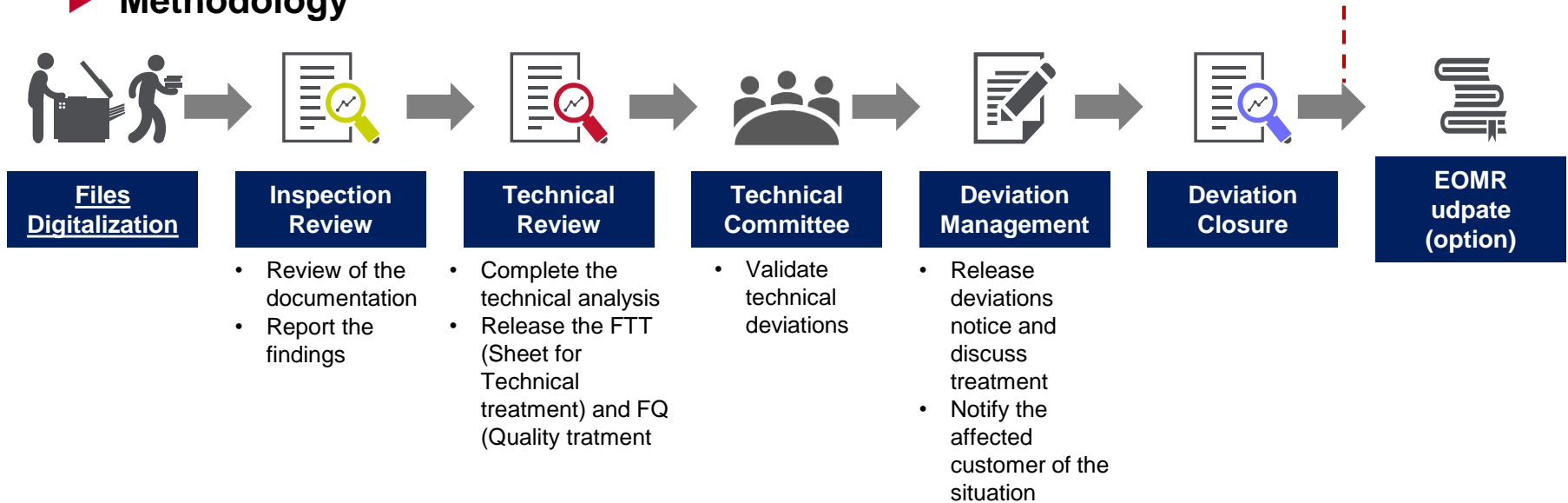
Past manufacturing files review status

Context

- ▶ In addition, and beyond the identification and assessment of the “marked files”, AREVA NP decided end of September 2016 to expand its review over all the forgings manufactured in Creusot Forge for Nuclear application
- ▶ This implies the review of all the records related to nuclear equipment manufactured by AREVA Creusot Forge
- ▶ There are around 6000 parts which have been manufactured in Areva Creusot Forge for nuclear application

Past manufacturing files review status

► Methodology



► Classification in 3 categories:

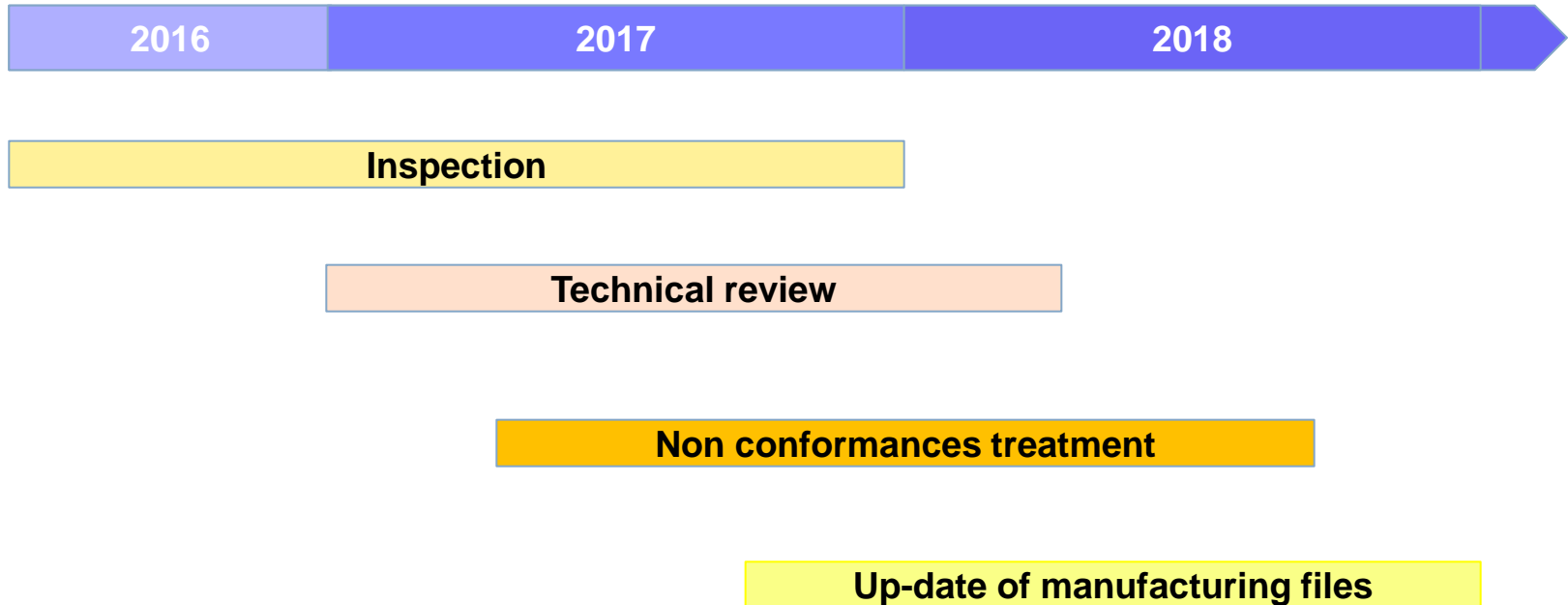
- No deviation
- Deviation to a Creusot Forge internal requirement
- Deviation to a Customer's requirement or a Code requirement

In case of a deviation to an internal, a Customer's or a Code requirement , two types of conformity reports will be issued:

- Internal NCN (Non Conformance Notice) provided for information to the customer
- Non Conformance Report to be reviewed and discussed by the customer

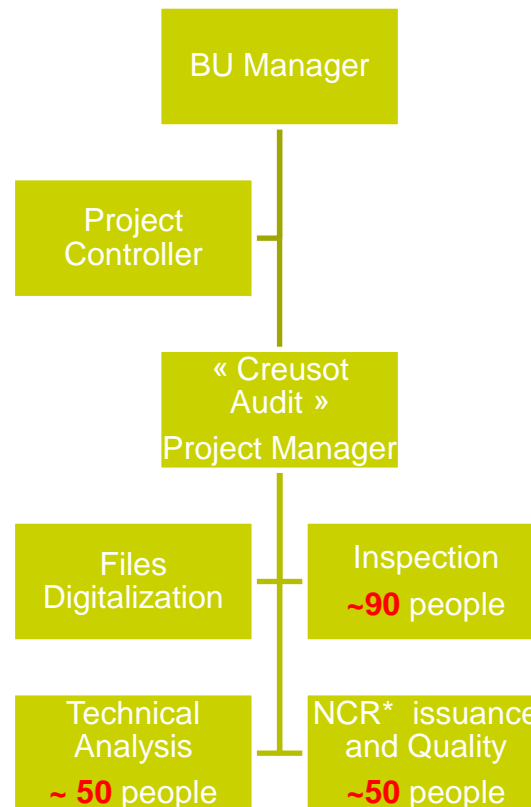
Past manufacturing files review status

Milestones



Creusot Quality Audit: organization

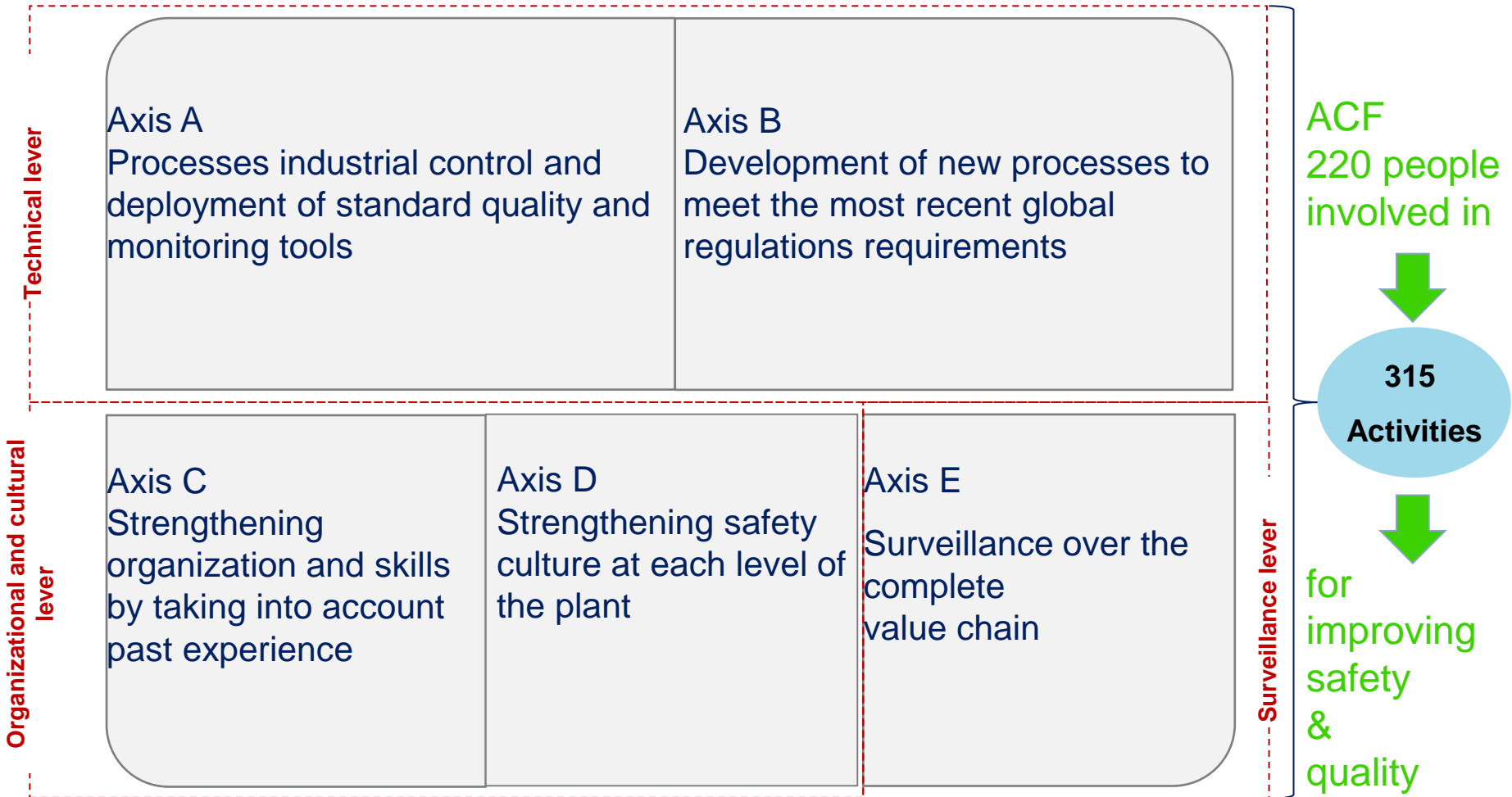
- ▶ A dedicated team of ~180 people has been set up in Paris in order to review the past manufacturing files



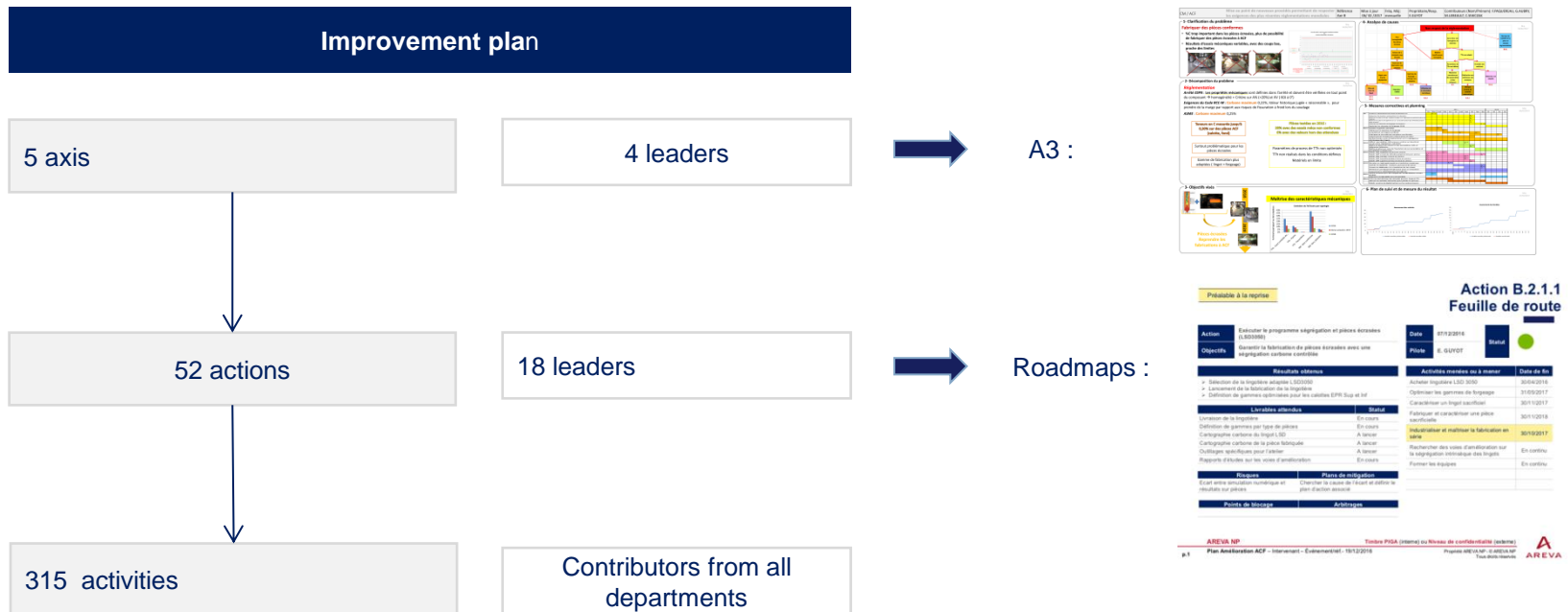
*NCR: Non-Conformity report

CREUSOT QUALITY IMPROVEMENT PLAN

Improvement Plan – Levers and Axes



- ▶ ACF improvement plan is structured according to a hierarchy of actions, attributed to leaders, and involving all team members.



- ▶ Each of the 52 actions is followed and integrated into ACF Management System

Summary of the Improvement Plan

Axis A	Axis B	Axis C	Axis D	Axis E
Processes industrial control and deployment of standard quality and monitoring tools	Development of new processes to meet the requirements of the most recent global regulations	Strengthening organization and skills as defined by taking into account past experience feedback	Strengthening safety culture at all levels of the plant	Surveillance over the complete value chain
A.1 - Identify technical causes of past malfunctions for different families of non-conformities	B.1 - Improve the monitoring of key process parameters	C.1 - Drawing the feedback from the analysis of the past	D.1 - Develop a communication plan to share the improvement plan with all staff	E.1 - Cause analysis and Risk analysis
A.2 - Deploy FMECAs and master key processes	B.2 - Material	C.2 - Identify key competencies and manage the corresponding recruitment plan	D.2 - Raising awareness of the culture of 100% transparency	E.2 – 1 st level : operational teams
A.3 – Ensure traceability	B.3 – Technical capability	C.3 - Know-how and sustainability	D.3 - Deploy a safety culture development program (with periodic evaluation)	E.3 – 2 nd level: Creusot Quality Direction
A.4 – Master the documentation	B.4 – Integration of nuclear pressure equipment prerequisites	C.4 - Organization of internal inspection & control	D.4 - Operational communication for improvement	E.4 – 3 rd level: independent oversight
A.5 - Strengthen the steering of non-conformities and associated corrective actions		C.5 – External interfaces		

MDEP inspection

- ▶ **Multinational Vendor Inspection (MDEP) took place Nov. 28th to Dec. 2nd in Creusot Forge**
 - 11 representatives from ASN, NRC, ONR, NNSA, CNSC, STUK**
- ▶ **The main objective of this inspection was to evaluate :**
 - ◆ “How Creusot Forge and AREVA NP control the conformity of forgings along the manufacturing process (past and future fabrications).”
- ▶ **Results :**
 - ◆ Letter received from ASN end of January : 18 Corrective Actions and 14 complementary information Requests related to (1) Improvement Plan of CF and (2) the review of past manufacturing files.
 - ◆ (1) - Almost of the actions were already included in the Improvement Plan of Creusot Forge issued in December 2016. The Plan was further updated in order to comply with all corrective actions
 - ◆ (2) – All the actions have been implemented
- ▶ **The major point is about Cultural Transformation – How to reinforce Safety Culture?**
 - ◆ This point is included in axis D implemented with the support of a company specialized in cultural transformation.
 - ◆ Several actions are already done such as elimination of the use of corrective fluid, reinforcement of traceability in case of modifications, safety Culture evaluation...
- ▶ **The efficiency of the actions is measured during the manufacturing of the already launched test parts (SG shell and MCL)**

Safety culture focus Training

- ▶ **Safety culture Assessment : done in week 8 / February 2017**
 - ◆ Result : **level 2** out of 3 : *“Safety is a key objective in the organization. As employee for nuclear energy, nuclear safety is an important matter for you. It’s time now for a permanent involvement”*
 - ◆ Our target : reach **level 3** implementation of cultural axis (axis D) of our Quality Improvement Plan

- ▶ **Set up of a three steps training :**
 - ◆ **Deployment of 20 one-day training session : *Learning of nuclear safety bases***
 - 20 sessions between May and June 2017
 - ◆ **Complementary one-day visit at Bugey NPP : *understanding of NPP safety issues***
 - 5 sessions forecast in June (28th -29th), July (11th & 13th) and September (20th)
 - ◆ **Final half-day session at St Marcel : *Knowing of internal customer, safety issues, steam generator***
 - ◆ **All ACF team involved = 220 people**

- ▶ **First results**
 - ◆ **Quizz made at the end of “Learning the nuclear safety bases” session**
 - **90%** accepted at first exam
 - ◆ **Second auto-evaluation quizz forecast in october/november to compare results with first evaluation.**

**Thank you
for your attention**