

Letter reference: CODEP-DEP-2021-032413

Dijon, 2 September 2021

**The Chairman of Framatome
For the attention of Ms De Bois
1, place Jean Millier
Tour AREVA
92400 COURBEVOIE**

Subject: 4th multinational inspection by the MDEP
Entity: Framatome
Place: Saint-Marcel plant (inspection conducted remotely and on site)
Code: INSNP-DEP-2021-0120 and INSNP-DEP-2021-1118 of 3 to 6 May and 28 June to 2 July 2021
Topic: Inspection of the manufacture of nuclear pressure equipment

References:

- [1] Order of 30 December 2015 amended concerning nuclear pressure equipment and certain safety accessories designed to protect said equipment
- [2] MDEP VICWG Common position, CP-VICWG-02, “*Common position: witnessed, joint, and multinational vendor inspection protocol*” of 4 November 2020

Dear Chairman,

Within the remit of ASN (Autorité de Sûreté Nucléaire) - the French nuclear regulator - concerning the oversight of manufacture of nuclear pressure equipment provided for in Article L. 592-22 of the Environment Code, a multinational inspection of your services was held from 3 to 6 May and from 28 June to 2 July 2021 in the workshops of the Framatome Saint-Marcel plant (Saône-et-Loire *département*).

I am pleased to send you below the summary of the inspection, along with the main requests and observations arising from the findings made by the inspectors during this inspection.

INSPECTION SUMMARY

The 4th multinational inspection conducted in accordance with the inspection protocol of the Multinational Design Evaluation Program (MDEP) under the auspices of the Nuclear Energy Agency (NEA), in reference [2], took place between May 3rd and July 2nd 2021. This inspection, coordinated by ASN under the references INSNP-DEP-2021-0120 and INSNP-DEP-2021-1118, with regard to the provisions of the order in reference [1], brought together inspectors from the nuclear regulators of the United States (USNRC), the United Kingdom (ONR), South Africa (NNR) and Finland (STUK).

Due to the Covid 19 health crisis, this inspection was essentially held remotely by video conference. Manufacturing operations were able to be watched live, with ASN inspectors present in the workshop.

The nuclear regulators participating in this multinational inspection found a common interest in jointly assessing the ability of the Framatome Saint-Marcel plant to manufacture compliant equipment in the following context:

- in the wake of the difficulties encountered by the Creusot Forge plant, which led to the 2nd multinational inspection by the MDEP in 2016 at Le Creusot, the quality organisation of the Framatome group's projects and components business unit has undergone significant changes with the implementation of several consecutive action plans which are still in progress in the unit's three plants (Creusot, Saint-Marcel and Jeumont);
- the Framatome Saint-Marcel plant has encountered technical difficulties resulting in a large number of manufacturing events of which the nuclear regulators kept each other informed, including the deviation in the local stress-relief heat treatments which has impacted projects intended for several countries.

Implementation of the improvement plans

The inspectors examined the provisions, the progress and the results of the various quality improvement plans currently implemented in the plants of the Framatome group's projects and components business unit. They also examined the provisions of the Saint-Marcel plant quality management system relative to the processing of nonconformities, to the internal audits and the control of special processes. They examined more specifically the setting up of measures to monitor the stress-relief heat treatment special processes, and they watched the application of certain welding processes. Lastly, they assessed the nuclear safety culture, within the limits determined by the conditions of performance of this inspection.

To summarise, the inspectors observed that Framatome has undertaken actions commensurate with the issues in order to improve quality within the Saint-Marcel plant. Positive results are observed through the quality indicators. The Framatome Saint-Marcel plant must now attain a stabilised situation which can be verified through concrete and measurable results, and to do so as quickly as possible.

The inspectors consider that the Framatome Saint-Marcel plant has a structured and mature process for dealing with deviations. They have nevertheless observed examples indicating that the plant must make further progress to move beyond a mode of reactive processing on a case-by-case basis, and stand back to learn the lessons from the deviations and the weak signals on a broader scale in order to prevent their recurrence. The main path to improvement identified at present concerns human factors, which are the cause of a large proportion of the problems detected.

As far as safety culture management is concerned, the inspectors noted the initiation of a process in 2020 with the implementation of a first self-assessment procedure within the plant, for which the low response rate raises questions. In the workshop the inspectors observed that the operators are aware of the importance and the impact of their actions on the equipment designed for nuclear reactors and that they can give concrete examples highlighting the results of the quality improvement plan.

Special process control

The inspectors examined the process for controlling special manufacturing processes put in place by the Framatome Saint-Marcel plant. They read the conclusions of the review of all the processes carried out in the first instance by the plant in response to detection of the deviation in the local stress-relief heat treatments of the welded joints.

They also reviewed the organisational changes based on two major actions: the setting up of a structured and documented quality process for the development and validation of new manufacturing processes (including an analysis of the risks, phases of development followed by process verification and validation, and follow-up actions after process implementation) and reconciling the existing manufacturing processes with this new quality process.

The inspectors note that the manufacturer has initiated a sound programme of actions which is proceeding at a good pace, and the target organisational process is considered robust. This being said, operational application of these actions to cover all the special manufacturing processes requires a considerable amount of time, which raised questions concerning the reactive actions undertaken in the short term while the manufacturing operations were still continuing in the workshop.

With regard to the heat treatment processes, the inspectors examined the measures taken by Framatome for the processing of the deviation in the local stress-relief heat treatments in view of the concerns of each nuclear regulator:

- this deviation is still being processed for the already manufactured equipment items concerned; consequently additional information is awaited on this subject;
- the inspectors consider that at present this deviation is being appropriately addressed with regard to the issues, as far as the French nuclear power reactor fleet is concerned;
- the inspectors consider that the technical measures updated for the furnace heat treatment processes and the local stress-relief heat treatment processes by induction help to improve the control of these processes;
- the inspectors consider that Framatome must continue to examine the lessons to learn from this deviation.

With regard to the welding processes which have undergone a documentary examination and in-shop observations, the inspectors have noted the benefits and risks resulting from the use of a system that enables the operators to have the operational documentation in digital format directly at the work station.

Five additional information requests and three observations have been issued for this inspection.

A. CORRECTIVE ACTION REQUESTS

Not applicable.

B. ADDITIONAL INFORMATION REQUESTS

Change of the quality indicators

The inspectors consider that the actions undertaken to improve quality are commensurate with the issues and constitute an appropriate response to the difficulties the Saint-Marcel plant has encountered over the last few years. The inspectors have observed the progress already made under the ongoing quality improvement plan. The Framatome Saint-Marcel plant must now attain, as soon as possible, a stabilised situation which can be verified through concrete and measurable results.

Request B1: I would therefore ask you to send me a communication plan (list of quality indicators and transmission schedule to be defined), so that ASN can monitor the progress of the quality improvement actions in the Framatome Saint-Marcel plant.

Special process control

Following detection of the deviation in the local stress-relief heat treatments, Framatome reactively analysed each of the plant's special manufacturing processes and concluded that they are properly managed, although it has identified actions to put in place for some of them.

Request B2: I would therefore ask you to inform me of the schedule and the prioritisation of the measures necessary for controlling all the Saint-Marcel plant's special manufacturing processes without reservations.

Framatome has adopted a methodical approach involving several steps with validation points for the industrialisation of manufacturing processes within the Framatome Saint-Marcel plant. In their examination of the method the inspectors did not find a step for periodically reviewing the manufacturing processes, a step that they consider necessary to guarantee the appropriateness of a manufacturing process over the long term.

Request B3: I would therefore ask you to indicate what periodic review methods are planned for in the quality management system of the Saint-Marcel plant, with regard to implementation of the method of industrialising a manufacturing process.

Stress-relief heat treatment processes

The inspectors consider that the appropriate procedures are applied for controlling the furnace and local induction stress-relief heat treatment processes. Framatome has assigned significant expert assessment resources to these processes. The root causes of the deviation in the local stress-relief heat treatments have been taken into account, particularly through a risk analysis. Framatome has also revised the stress-relief heat treatment procedures and put in place checks of the implementation of each stress-relief heat treatment with corresponding check-lists.

Request B4: I would therefore ask you to send me your analysis of the appropriateness of the expert assessment resources assigned to the other special processes, particularly the most complex ones, compared with the means implemented for the stress-relief heat treatment processes.

The inspectors examined the lessons learned from the deviation in the local stress-relief heat treatments, for the controlling of the furnace and local induction stress-relief heat treatment processes. They noted a lack of traceability of the implementation of the operations carried out for these two processes (no dimensional measurement for the heating and insulating elements or thermocouples), and a lack of precision in the methods for conducting and monitoring in-process operations , particularly in the event of a contingency.

Request B5: I would therefore ask you to take into consideration, for the furnace and local induction stress-relief heat treatment processes, all the lessons learned from the analysis of the deviation in local stress-relief heat treatments, particularly regarding recording of the position of the various insulating, heating and temperature measurement components, and the conditions for conducting and monitoring ongoing stress-relief heat treatment operations.

C. OBSERVATIONS

Sharing experience feedback

The inspectors noted that the operators were unaware of several previous events relating to the processes they implemented, or affecting equipment items similar to those they were working on. The inspectors consider that sharing such experience with the operators would be a way of drawing their attention to the risks and increasing their vigilance.

C1: The questioning attitude of the operators regarding the items they manufacture and their work equipment should be encouraged by greater sharing of experience feedback and lessons learned.

Recording of technically checked data

The inspectors observed the technical checking of the welding operations. The purpose of the checking actions is to assess the conformity of certain manufacturing parameters. However, the checked parameters are not formally recorded. Consequently, their traceability is not guaranteed.

C2: The inspectors consider that formalised recording of the parameters observed and assessed by the technical inspectors would be a good practice that could help to settle doubts if necessary.

Use of computerised systems in the workshop

With regard to the welding processes which underwent a documentary examination and in-shop observations, the inspectors noted the implementation of a system providing the operators with the operational documentation in digital format directly at the work station. The inspectors noted that this system provides several guarantees, such as control of the progress of equipment manufacture and operator qualification. They recognise the benefits of this solution, benefits that are widely acknowledged by the operators themselves.

In the workshop, the inspectors observed the practice of manually transcribing certain manufacturing parameters onto a check-list available to the operator at the work station. They did not see any errors during their observations, but this practice is nevertheless a potential source of errors, especially where complex manufacturing operations are concerned. Human factors were moreover identified as being one of the main sources of deviations within the plant. More generally, the inspectors noted a tendency for the operators to rely solely on the automatic checks performed by such computerised systems. This excess of confidence was also highlighted in the course of the inspection when welding material was withdrawn from the supplies storeroom, despite an event in 2020 where the computerised check malfunctioned, resulting in withdrawal of the wrong material.

C3: To counter the risks associated with excessive reliance on such systems, the operators should be encouraged to have a questioning attitude and to carry out additional verifications whenever possible.

Kindly send me your comments and answers concerning these points within a maximum of two months. As regards any commitments you might make, I would ask you to identify them clearly and indicate a date of accomplishment for each one.

Lastly, in accordance with the transparency and public information approach instituted by the provisions of article L. 125-13 of the Environment Code and in accordance with Article R. 596-5 of the Environment Code, I inform you that this letter will be posted on line on the ASN website (www.asn.fr).

Yours sincerely,

The Director of ASN/DEP,

SIGNED

Corinne SILVESTRI