

Hardies, Robert

**From:** VAN WONTERGHEM Frederik [Frederik.VANWONTERGHEM@FANC.FGOV.BE]  
**Sent:** Monday, August 13, 2012 10:35 AM  
**To:** jean-luc.lachaume@asn.fr; francois.balestreri@irsn.fr; Sebastien.CROMBEZ@asn.fr; Klaus.Germerdonk@ensl.ch; Ryf Martin; Hardies, Robert; lutz.lindhorst@ilent.nl; Wiel, ir. L. van der; C.Hoogwerf@mineleni.nl; erik.zeelenberg@lr.org; Thomas.Schimpfke@grs.de; Mihdi.Elmas@grs.de; bsf@csn.es; stephen.druce@hse.gsi.gov.uk; Richard.Sundberg@ssm.se  
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**Subject:** Technical Meeting "indications in Doel 3 Reactor Pressure Vessel" : August 16  
**Attachments:** Doel 3 Working Meeting 2012-08-16 Participants list - CONFIRMED.xlsx

Dear participants to the Doel 3 RPV workshop,

This technical working meeting shall take place in Brussels on **Thursday 16 August between 10h00 and 16h00**.

Change in venue:

Based on the number of participants, the FANC has decided to move the technical meeting to a meeting room in the conference centre of the **Federation of Entreprises in Belgium (FEB-VBO), Ravensteinstraat 4, 1000 Brussels** (just 100m away from the FANC offices). This conference centre is a short walk from the central railway station (Bruxelles Central/Brussel Centraal).

More information on how to reach this conference centre can be found on this website: <http://vbo-feb.be/en/location/>

Registration of participants for this meeting will start at 9h30 at the FEB-VBO offices. Only registered participants (see list in attachment) will be accepted to participate to the meeting.

Should additional members of your organisation wish to participate, please send me a reply by email as soon as possible. A hand-out of all presentations during the meeting will be provided at the start of the meeting.

At the moment, the following organisations have already confirmed their participation to the working meeting

- Belgium: FANC, Bel V, AIB Vincotte International
- France : ASN, IRSN
- Switzerland: ENSI
- Netherlands: KFD, Ministry of E L&I , Lloyds Register
- Germany: GRS
- Spain: CSN
- United Kingdom: ONR
- Sweden: SSM

The preliminary agenda for the meeting is as follows:

1. Introduction (FANC)
2. Presentation of Inspection results at Doel 3 (Electrabel – Tractebel Engineering)
  - Regulatory framework
  - Construction File of Doel 3 RPV
  - Manufacturing & In-Service Inspections results
  - Metallurgical origin of the indications found at Doel 3
  - Justification strategy for the indications found at Doel 3Q&A
3. Presentation of Belgian regulatory body approach for this issue (FANC- Bel V – AIB Vincotte)
4. Presentation on international feedback on questionnaire (Bel V)
  - RDM vessels in the world
  - In-service inspection & results

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5. Roundtable discussion between regulatory bodies:

- Similar in service inspections performed in your countries on the reactor vessels forged by RDM (and possible results)
- Comments on the proposed licensee approach to justify the structural integrity of the reactor vessel
- Implications for other NPPs in the world: possible actions to be taken

If you have any further questions, feel free to contact me (tel. (b)(6))

Best regards,

Frederik Van Wonterghem

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**Verzonden:** 08 August 2012 17:06

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**Onderwerp:** RE: URGENT Message on Nuclear Safety: Flaw indications in Doel 3 Reactor Pressure Vessel

Dear all

I would like to give you some additional information regarding the working meeting of Thursday 16 August:

1. All presentations and discussions during the meeting will be conducted in English
2. At the start of the meeting, the licensee of the Doel NPP (Electrabel) will give a presentation containing the latest information on the flaw indications found at Doel 3, possible causes and the ongoing licensee studies. After this presentation, specific questions can be addressed to the licensee.
3. As mentioned already in the mailing, the roundtable discussion between regulatory bodies should focus on the following main topics:
  - Similar in service inspections performed in your countries on the reactor vessels forged by RDM (and possible results)
  - Comments on the proposed licensee approach to justify the structural integrity of the reactor vessel
  - Implications for other NPPs in the world: possible actions to be taken
4. At the moment, the following organisations have already confirmed their participation to the working meeting
  - a. Belgium: FANC, Bel V, AIB Vincotte International
  - b. France : ASN, IRSN
  - c. Switzerland: ENSI

Best regards

Frederik Van Wonterghem

**Van:** VAN WONTERGHEM Frederik

**Verzonden:** 03 August 2012 11:05

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**Onderwerp:** URGENT Message on Nuclear Safety: Flaw Indications in Doel 3 Reactor Pressure Vessel

Dear all,

This week, a preliminary IRS Incident Report was published by Belgium related to the detection of a large number of flaw indications in the reactor pressure vessel of Doel 3 (PWR - Framatome Design). (Reference IRS Number 8244: "FLAWS INDICATIONS IN THE REACTOR PRESSURE VESSEL"). In attachment you can find a copy of this IRS report.

As indicated in the IRS report, the Doel 3 NPP outage has been extended to allow further inspections and to perform additional studies by the licensee to analyze and, if possible, to validate and confirm the structural integrity of the vessel. At the moment, the licensee supposes that the flaw indications were already present at the moment of forging of the vessel, which was done by Rotterdam Droogdok Maatschappij (also referred to as Rotterdam Dockyards or RDM). Both a deterministic approach (in accordance with ASME XI Appendix A) and a probabilistic approach (in accordance with 10CFR50.61a) are being considered by the licensee to justify the structural integrity of the reactor vessel.

Some additional information on the types of flaw indications and other possible reactor vessels forged by this company can be found below.

Considering the potential consequences of this event, the Belgian regulatory body would like to organise on short notice a technical working meeting in Brussels on this issue for those regulatory bodies which could be interested by these findings, specifically those regulatory bodies of countries where RPVs forged by RDM can be present. During this technical working meeting, additional information on the results found at Doel 3 NPP and the on-going licensee investigations and calculations will be made available by the Belgian regulatory body (FANC, its technical support organisation Bel V and the Authorized Inspection Authority AIB Vincotte International). In addition, a roundtable discussion between regulatory bodies will be held to discuss relevant experiences with this kind of inspections and flaw indications. Specific topics/questions to be discussed during this roundtable discussion are mentioned in an email by Bel V which was sent last week (see attachment). We are especially interested to know if this type of ISI was already performed in your countries on the reactor vessels forged by this company, and if so, what the results have been. May we kindly invite every country to present additional available input and thoughts to our working meeting.

**This technical working meeting shall take place in Brussels (FANC offices, Ravensteinstraat 36, 1000 Brussels) on Thursday 16 August between 10h00 and 16h00.**

We would be very grateful if one or more technical experts of your organisation could be present during this working meeting.

To confirm your participation, please send me a reply by email to [frederik.vanwongerghem@fanc.fgov.be](mailto:frederik.vanwongerghem@fanc.fgov.be) (tel. ++32 2 289 2082) before Friday 10 August.

If you have further technical questions on this event, you can contact [pierre.briegleb@belv.be](mailto:pierre.briegleb@belv.be) (tel ++32 2 528 0245).

A second technical working meeting could be held in the near future (presumably early September) to discuss the available results of the additional inspections at Tihange 2 and the results of the licensee investigations and calculations aiming to confirm the structural integrity of the reactor vessel. Further actions in your countries can also be discussed during this second meeting. We will inform you as soon as possible of the timing of this second working meeting.

Best regards,

Frederik Van Wouterghem

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#### **Additional information on the types of flaw indications and other possible reactor vessels**

##### Preliminary results from additional inspections

- As described in the IRS message, considering the limitations of the inspection method which revealed the presence of those defects, an inspection of the whole height of the RPV with the UT-qualified method used to control the beltline welds has subsequently been performed. This inspection covers the whole thickness and the whole height of the RPV of Doel 3.
- The preliminary results from those additional inspections confirm the presence of several thousand (up to 10000) flaw indications in the reactor vessel base material. These flaw indications seem to be laminar in shape and have average diameters of 25 mm.

##### Reactor Pressure Vessels forged by Rotterdam Droogdok Maatschappij (also referred to as Rotterdam Dockyards or RDM)

- The Doel 3 and Tihange 2 RPVs were forged by RDM, which according to the Licensee Electrabel provided some 20+ vessels in Europe and the US.
- The table below gives an overview of these RPVs (this list has been established by the licensee and could contain errors or omissions).

Atucha 1	PHWR		335	1980	Siemens
Doel 3	PWR	3	1000	1982	Framatome
Tihange 2	PWR	3	1000	1982	Framatome
Brünsbittel	BWR	-	770	1977	KWU
Philippsburg 1	BWR	-	890	1980	KWU
Dodewaard	BWR	-	52	1968	RDM
Borssele	PWR	2	515	1973	KWU
S <sup>ta</sup> Maria de Garona	BWR		450	1971	General Electric
Cofrentes	BWR	-	1064	1984	General Electric
Ringhals 2	PWR	3	813	1974	Westinghouse
Leibstadt	BWR	-	1165	1984	General Electric
Mühleberg	BWR	-	373	1971	General Electric
Catawba 1	PWR	4	1129	1985	Westinghouse
McGuire 2	PWR	4	1100	1983	Westinghouse
North Anna 1	PWR	3	903	1978	Westinghouse
North Anna 2	PWR	3	973	1980	Westinghouse
Quad Cities 1	BWR	-	882	1972	General Electric
Sequoyah 1	PWR	4	1162	1980	Westinghouse
Sequoyah 2	PWR	4	1126	1981	Westinghouse
Surry 1	PWR	3	839	1972	Westinghouse
Surry 2	PWR	3	800	1973	Westinghouse

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