



Office for  
Nuclear Regulation

ONR Contact Record

**EDF Energy NGL Torness Power Station Grid  
Disturbances Discussion - 28 June 2023**

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EDF Energy NGL Torness Power Station Grid Disturbances Discussion - 28 June 2023

Contact Record ID: ONR-OFD-CR-23-186

Internal Record Ref. No.: 2023/36991

Issue No.: [0]

Date of Contact: 28 June 2023

Date Issued: 05 July 2023

Completed/ Compiled by: [REDACTED], electrical specialist inspector, operating reactors

## Contact Information

Name	Position/Role Title	Organisation
[REDACTED]	Chief Electrical Engineer	EDF Energy NGL
[REDACTED]	Fleet lead engineer	EDF Energy NGL
[REDACTED]	Fleet lead engineer	EDF Energy NGL
[REDACTED]	Electrical specialist inspector	ONR
[REDACTED]	Torness nominated site inspector	ONR

**Type of Contact:** Virtual meeting

# Summary/Key Points

## Summary

This level 4 interaction was arranged with EDF Energy Nuclear Generation Ltd (NGL) representatives to enhance the Office for Nuclear Regulation (ONR) understanding of the disturbances, from this point forward known as sub-synchronous oscillations (SSO), that are being experienced on the national grid transmission network by the relevant transmission network operator and which have affected operations at the EDF Energy NGL Torness reactor power station.

## Key Points

EDF Energy NGL provided advice describing the SSOs including their magnitude duration and frequency using a pre-prepared presentation (2023/35968).

Two SSO events occurred in August 2021. They were ~same magnitude, lasted for ~20 seconds and were ~30 minutes apart. At that time both units at TOR remained on (didn't trip) and station's generator responded, coincident with the SSO, by reducing the reactive power output to the grid.

Since August 2021 the transmission operator has been investigating the source of the SSO but without success.

There have been no further SSOs experienced until June 2023, when, there was a SSO event of similar nature to that in August 2021 on 12 June 2023. Torness Unit 1 was off and Unit 2 tripped.

Another SSO event of similar nature occurred on 21 June 2023. Both units at Torness remained on (didn't trip).

The transmission network operator has been attempting to identify the source of the latest SSO events through the systematic isolation of various grid bulk generation sources.

The isolation of bulk generation sources requires various logistically complex switching activities to be undertaken.

On 25 June multiple SSO events occurred. All similar in nature to the previous SSO events and both units at TOR remained on (didn't trip).

On 27 June there were 2 more SSO events of similar nature to the previous SSO events and both units at TOR remained on (didn't trip).

EDF Energy NGL advised that they are confident that the source of the SSO events is not at Torness as a single unit is able to respond in the same manner as when both units are on (not tripped).

EDF Energy NGL advised that the SSO events are short in duration and due to the level of sensitivity in the generator's automatic voltage regulator's (AVR) power system stabiliser, the generator's excitation protection systems can recognise a particular fault resulting in tripping the main generator.

We were advised that EDF Energy NGL's electrical central technical organisation (CTO) have been in consultation, internally, with mechanical engineering CTO on the vulnerabilities and the potential consequences to the main generators. It is considered by EDF that the main generator design is resilient to the SSO events experienced and the intent is to seek confirmation of this with the original equipment manufacturer (OEM).

We were advised that there are good communications with transmission network operator and Ofgem on this matter, with no perceived barriers or obstacles. The transmission network operator's 'silver command' has been initiated in support, to expedite the removal of any barriers to progress and/or obtain relevant resources and it has become a top priority for the transmission network operator, EDF Energy NGL and Ofgem.

In parallel to transmission network operator's investigations, into the source of the SSO events and since the onset of the latest events, EDF Energy NGL are looking to enhance their own resilience to future SSO events. EDF Energy NGL have been engaged with the General Electric (GE), the AVR OEM, to understand the response of the AVR and its power system stabiliser to an SSO event.

EDF Energy NGL have also confirmed that there are no grid compliance issues with the AVR and the transmission network operator are content.

EDF Energy NGL and GE have been unable to simulate the SSO events and therefore the responses on the AVR and its power system stabiliser but have been able to model them.

Through the modelling, it has been identified that limit setting within the AVR's power system stabiliser, if altered, could respond positively to similar SSO events.

A level of confidence on the modelling was gained by altering limit setting within the model and confirming the AVR's modelled response.

The actual limit setting within the AVR's power system stabiliser has been found, however, to be 'locked or 'fixed'. EDF Energy NGL are working with the OEM to understand if and how this limit setting can be altered.

EDF Energy NGL undertook to arrange weekly teleconferences going forward from this point.

# 1. Issues

## 1.1. Issues Raised

Table 1: Issues raised

WIRed Unique ID Ref.	Issue Title	Owner (inspector)
None		

## 1.2. Issues Closed

Table 2: Issues closed

WIRed Unique ID Ref.	Issue Title	Owner (inspector)
None		

## 1.3. Circulation List

Table 3: Circulation list

Organisation	Name/responsibility	Date
ONR	Mark Foy, chief nuclear inspector  Donald Urquhart, executive director operations  Michael Finnerty, operating facilities, director of regulation  [REDACTED] operating reactors sub-division delivery lead  [REDACTED] operating reactors sub-division assessment lead  [REDACTED] operating reactors DMG lead  [REDACTED] E, C&I professional lead	05/07/2023

Organisation	Name/responsibility	Date
	<p>██████████ Inspector, operating reactors</p> <p>██████████ specialist, operating reactors</p> <p>██████████ specialist inspector, operating reactors</p> <p>██████████ specialist inspector, operating reactors</p> <p>██████████ specialist inspector, operating reactors</p> <p>██████████ specialist inspector, nuclear new build</p> <p>██████████ specialist inspector, nuclear new build</p> <p>All site inspectors, operating reactors</p>	
EDF Energy NGL	<p>██████████@edf-energy.com</p> <p>██████████@edf-energy.com</p> <p>██████████@edf-energy.com</p> <p>██████████@edf-energy.com</p> <p>██████████@edf-energy.com</p>	05/07/2023

## 2. Export Control

During this contact, has export controlled information (ECI) been shared outside the UK?	<b>Yes</b>	
	<b>No</b>	<b>X</b>

**Table 4: Export licence use - tracking information**

<b>Export licence ref:</b> View <a href="#">Export Licence Library</a>		
<b>Company name and address of end user:</b> View <a href="#">Export Licence Library</a>		
<b>Trigger list information shared:</b> Click <a href="#">here</a> to access guidance.	Choose an item.	
<b>Which reactor technology and/or site is this information regarding?</b>	(e.g., HPR1000, EPR, Sellafield)	
<b>Reason for ECI exchange:</b>	(e.g., GDA, IAEA mission, design review, supply chain inspection)	
<b>Country of ECI technology origin:</b>		
<b>Means of transfer:</b>	<b>Shared verbally (either via teleconference or videoconference)</b>	
	<b>Documents shared electronically</b>	
	<b>Documents shared physically</b>	