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Sigmon, Rebecca

From: Thorp, John *in VR*
Sent: Wednesday, August 24, 2011 3:15 PM
To: Pruett, Troy
Cc: Garmon, David; Sigmon, Rebecca; Thomas, Eric; Boger, Bruce; McGinty, Tim
Subject: FW: INES and Beyond Design Bases Hazards
Attachments: 2011 Mineral VA Earthquake INES Rating 0 ERF Rev 3.docx

Troy,

Please see the attached draft assessment of the INES rating for the North Anna event. Once you've indicated you're ok with this assessment, we'll inform Eric Leeds for his information and comment. After we resolve any questions Eric (or whoever is acting for Eric) might have, we'll send to Cynthia Jones for transmittal to INES system. Our goal is to transmit this rating to INES by mid-day on Thursday (within the normal 2 business day criteria for INES reports).

Additionally, below, please see the explanation by my staff for the event initiator versus the "hazard" experienced. We consider this case at North Anna to be the loss of offsite power as the initiator of the event with resultant trip and plant response. Thus, the magnitude of the hazard (quake), unless it by itself were to cause losses of safety function, is irrelevant to the INES rating. We believe this is a pretty clear "Zero" (below scale) using the INES rating criteria. In this event, safety functions were maintained within Technical Specification limits, allowing a rating of Zero.

This is a preliminary rating. We're reserving final judgment on the rating until after the additional analysis and special inspection activities are completed, to allow us to take into account anything that might result from those activities. The impact on final rating could come from any additional factors we learn of, such as common cause failures, procedural inadequacies, or Safety Culture issues that had an actual effect on the licensee's response to this event.

If the ground motion and acceleration turn out to be beyond design basis, the licensee (with NRC independently checking) would need to evaluate the actual effect on the various safety functions from this condition, and we would then need to conduct an INES rating for an event "seismic damage to XXX safety function" as an event without an initiator. This would actually be a separate event and associated rating.

The USNRC's participation in the International Nuclear and Radiological Event Scale is described in Information Notice 2009-27, dated November 13, 2009, Agency wide Documents Access and Management System Accession No. ML092510055. USNRC generic communications can be found on the USNRC public website <http://www.nrc.gov>, under NRC Library/Document Collections.

Give us a shout if you have any questions.

Thanks,

John

From: Garmon, David *in VR*
Sent: Wednesday, August 24, 2011 12:52 PM
To: Thorp, John
Cc: Sigmon, Rebecca
Subject: INES and Beyond Design Bases Hazards

John,

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The initiator is an identified event that leads to a deviation from the normal operating state and challenges one or more safety functions. For the purposes of the INES initiators are separate and distinct from hazards (e.g. fires, earthquakes, floods etc.).

From page 77 of the manual...

The occurrence of internal and external hazards such as fires, floods, tsunamis, explosions, hurricanes, tornados or earthquakes, may be rated using table 9 [events with real initiators]. The hazard itself should not be considered as the initiator (as the hazard may cause either initiators or degradation of safety systems or both), but the safety systems that remain operable should be assessed against an initiator that occurred and/or against potential initiators.

In other words, we would have to see if the safety function of any components were degraded due to a beyond design basis earthquake. We would then use that information to develop a separate rating that considers the newly identified loss of safety function. As it stands now, North Anna really did not have a loss of safety function because they had a redundancy in the form of a station blackout diesel.

Rebecca, the question is what would the effect on the rating be if, hypothetically, a plant experienced a beyond design basis earthquake with a loss of offsite power.

Regards,
David Garmon

NRR/DIRS/IOEB
(301) 415-3512
Office: O-7C20
Mail Stop OWFN-7C02A

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Comments by Rebecca Sigmon on the above question:

I think what the beyond design basis earthquake would do is call into question whether safety function was still there. As you say below, the earthquake itself would be considered an unanalyzed initiator; the LOOP or scram is the initiator. I think what the beyond DBE does is say, how can we say that safety systems rated to DBE can still be credited in a beyond DBE? Obviously if they actually function, then we know they work, but I think it's something we'd have to analyze with more data, and wouldn't be able to make a spot rating assignment. For a hypothetical case, if a beyond design basis earthquake happened and affected safety injection systems so that they didn't actually work (cracked pipes, broken pumps, whatever), but the earthquake didn't cause a LOCA so the systems weren't required, even if the EDGs worked as designed and there was no actual safety consequence, I think that would be at least a 2 based on degradation of defense in depth. It would be an interesting discussion though, with a case to be made for a 3 and a case to be made for a 0.

EVENT RATING FORM (ERF)

THE INTERNATIONAL NUCLEAR EVENT SCALE (INES)														
EVENT TITLE Alert Emergency Action Level Declaration due to Loss of Offsite Power Resulting from a Seismic Event													EVENT DATE 2011.08.23	
RATING	RATING	OUT OF	DEVIATION	INCIDENT	ACCIDENT					FACILITY TYPE				
PROVISIONAL ☒	DATE	SCALE	0	1	2	3	4	5	6	7	Power Reactor ☒	Research Reactor ☐		
FINAL ☐	2011.08.23	☐	☒	☐	☐	☐	☐	☐	☐	☐	Radwaste Facility ☐	Radiation Source ☐		
COUNTRY United States of America			FACILITY NAME North Anna Power Station								Irradiation ☐	Transportation ☐		
LOCATION Louisa, Virginia											Fuel Fabrication ☐	Fuel Reprocessing ☐		
											Research Facility ☐	Mining/Milling ☐		
											Enrichment Facility ☐	Other ☐		
OFF-SITE IMPACT											YES	NO		
RELEASE BEYOND AUTHORIZED LIMITS											☐	☒		
OVEREXPOSURE OF MEMBERS OF PUBLIC											☐	☒		
ON-SITE IMPACT														
CONTAMINATION SPREAD											☐	☒		
WORKER OVEREXPOSURE											☐	☒		
DAMAGE TO RADIOLOGICAL BARRIERS											☐	☒		
DEGRADATION OF DEFENSE IN-DEPTH											☐	☒		
PERSON INJURED PHYSICALLY OR CASUALTY											☐	☒		
IS THERE A CONTINUING PROBLEM											☐	☒		
PRESS RELEASE ISSUED (IF YES, PLEASE ATTACH)											☒	☐		
EVENT DESCRIPTION														
At 1403 (EDT), on August 23, 2011, Units 1 and 2 of the North Anna Power Station declared an Alert, Emergency Action Level due to a loss of offsite power. The North Anna Power Station is located in Louisa, Virginia which is about 84 miles (135 km) southwest of Washington, D.C. The Alert was declared following a seismic event rated as a 5.8, using the Richter Scale, by the U.S. Geological Survey; the epicenter of the seismic event occurred at a distance of about 12 miles (18 km) from the North Anna Power Station. Both North Anna units experienced a complete loss of offsite alternating current (AC) power (LOOP) sources														

to emergency electrical buses due to the actuation of transformer pressure relays from the effects of seismic action. The four onsite emergency diesel generators (EDGs) started and powered the station emergency electrical buses after the LOOP. About 40 minutes after the EDGs started, one of the EDGs supplying power to the Unit 2 emergency buses, designated as the 2H EDG, was shut down by operators in response to a radiator leak. A backup, station blackout diesel generator was started to assume the loads that were being supplied by the 2H EDG.

As of August 24, 2011, Unit 1 and Unit 2 are proceeding to cold shutdown conditions to allow for inspections inside containment. The North Anna Power Station has exited all Emergency Action Levels. Normal offsite power has been restored to the North Anna Power Station. All EDGs have been shut down and returned to a standby condition. The 2H EDG has been repaired and is awaiting retest; however, it is considered available if needed. Reactor coolant chemistry sample results are normal with no indications of any fuel damage. All reactor coolant pressure boundaries and containment boundaries are intact as designed.

Additionally, a number of plants in the eastern United States declared a Notice of Unusual Event (NOUE) due to seismic activity at their respective sites. Plants declaring NOUEs due to the potential for a decrease in plant safety include Peach Bottom, Three Mile Island, Susquehanna and Limerick in Pennsylvania; Salem, Hope Creek and Oyster Creek in New Jersey; Calvert Cliffs and a research reactor in Maryland; Surry in Virginia; Shearon Harris and a research reactor in North Carolina; and D.C. Cook and Palisades in Michigan. All of these plants exited their NOUE declarations after completing inspections and receiving confirmation of normal conditions.

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RATING JUSTIFICATION AND DIFFICULTIES ENCOUNTERED

The provisional rating for this event has been determined to be a Level 0 in accordance with the International Nuclear and Radiological Event Scale User's Manual 2008 Edition.

Level 0 was determined by the following approach:

There were no actual radiological consequences from this event as defined in chapters 2 and 3 of the manual. The *Initiator Frequency* (Section 5.1.1) for a reactor trip with loss of offsite power is *Expected*. The *Safety Function Operability* (Section 5.1.2) was determined to be less than *Full* but more than the *minimum required by operational limits and conditions* based on the availability of a backup, station blackout diesel generator that was capable of providing adequate redundancy and diversity. The Basic Rating of 0 was determined using box A(1) in Table 9, "Events with a Real Initiator" (Section 5.1.3). Section 5.2 was considered and it was determined that there were no additional factors associated with this event that required elevating the event rating.

CONTACT PERSON FOR FURTHER INFORMATION

NAME		AFFILIATION	United States Nuclear Regulatory Commission		
ADDRESS	U.S. Nuclear Regulatory Commission Washington, DC 20555-0001				
PHONE		FAX		E-MAIL	