Charles Eccleston

10/23/2009

74FR54859

(1)

From: Greenhill, John [mailto:John.Greenhill@dhs.gov]
Sent: Wednesday, November 04, 2009 7:18 PM
To: Eccleston, Charles
Subject: Salem and Hope Creek Nuclear Plants 20 year license extensions
Importance: High

Dear Mr. Eccleston,

I am unable to attend the hearings on 11/5/09 but would like to submit the following questions.

There were incidents on 3/13/1989 and 9/19/1989 at the Salem 1and 2 Nuclear Plants sites when geomagnetic storms caused damage to the single phase, generator step-up transformers which caused them to be taken out of service.

The damages were due to geomagnetically induced currents caused by the geomagnetic storms.

Questions:

1. Is there a publically available report that describes these incidents?
2. What was the magnitude of the currents that caused the damage?
3. How long did the damaging currents persist?
4. What was the protective relay system in place at that time such as the IEEE Std C37.91-1985?
5. Where there any modifications to the transformer protective system put into effect?
6. How will the step-up transformers at Salem and Hope Creek sites be protected if a super geomagnetic storm (10 times the size of the 1989 storms) occurs during the 20 year extension?
7. Do the sites have spare step-up transformers?

John D. Greenhill P.E.
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National Communications System
Department of Homeland Security
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Phone: 703-235-5538

SUNSI Review Complete
Template = ADM-013

E-RIDS = ADM-03
Add = J. Susco (JJS1)

Eccleston, Charles

From: Greenhill, John [John.Greenhill@dhs.gov]
Sent: Monday, November 09, 2009 3:46 PM
To: Eccleston, Charles
Subject: RE: Salem and Hope Creek Nuclear Plants 20 year license extensions

Charles,
Many thanks for this information.
An initial cursory look shows a possible problem with this draft EIS when one examines table 5-2

Table 5-2. TMI-1 Internal Events Core Damage Frequency

Initiating Event	CDF (Per Year)	% Contribution to CDF
Loss of Offsite Power	7.73×10^{-6}	32.6
Transients	5.80×10^{-6}	24.5
Small and Very Small LOCA	4.66×10^{-6}	19.7
Loss of Nuclear Service River Water	3.67×10^{-6}	15.5
Steam Generator Tube Rupture	9.93×10^{-7}	4.2
Internal Floods	4.50×10^{-7}	1.9
Large and Medium LOCA	2.06×10^{-7}	< 1
ISLOCA	1.80×10^{-7}	<1
Total CDF (internal events)	**2.37×10^{-5}**	**100**

The probability of a super solar storm of the 1859 or 1921 size is about 1/100 years or 1 %/year. This size storm leads to a continental long term (many months) grid outage because of damage to all the U.S. step-up transformers similar to the damage that occurred at Salem New Jersey in 1989during a fairly mild solar storm. With such an outage the emergency generators (that drive the cooling pumps) fuel supply would run out and could not be replaced because the commercial fuel suppliers would be out of fuel as well. Without fuel for the the cooling pumps, the core damage frequency (CDF) appears to be several orders larger that the CDF given in the table 5-2. Perhaps s solar storm initiating event should be included in all the final EIS documents.

John D. Greenhill P.E.
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From: prvs=557c0bb17=Charles.Eccleston@nrc.gov [mailto:prvs=557c0bb17=Charles.Eccleston@nrc.gov] **On Behalf Of** Eccleston, Charles
Sent: Monday, November 09, 2009 3:02 PM
To: Greenhill, John
Subject: RE: Salem and Hope Creek Nuclear Plants 20 year license extensions

John,

Here is a recent draft EIS. You will have to open it as a read-only file. Check out Chapter 5.

Eccleston, Charles

From: Greenhill, John [John.Greenhill@dhs.gov]
Sent: Saturday, November 21, 2009 9:24 PM
To: SalemEIS; HopeCreek@nrc.gov
Cc: Eccleston, Charles; Warren Udy
Subject: Salem and Hope Creek Nuclear Plants 20 year license extensions

Dears Sirs

There were incidents on 3/13/1989 and 9/19/1989 at the Salem 1,2and Hope Creek nuclear plants sites when geomagnetic storms caused damage to the single phase, generator step-up transformers which caused them to be taken out of service.

The damage was due to geomagnetically induced currents (GIC) caused by the geomagnetic storms.

Questions:

1. Is there a publically available report that describes these incidents?
2. What was the magnitude of the currents that caused the damage?
3. How long did the damaging currents persist?
4. What was the protective relay system in place at that time such as the IEEE Std C37.91-1985?
5. Where there any modifications to the transformer protective system put into effect?
6. How will the step-up transformers at Salem and Hope Creek sites be protected if a super geomagnetic storm (10 times the size of the 1989 storms) occurs during the 20 year extension? The next solar maximum is expected 2013-2014.
7. Do the sites have spare step-up transformers?

The TMI Generic Environmental Impact Statement for License (NUREG-1437 Supplement 37) table 5-2 shows the following

Table 5-2. TMI-1 Internal Events Core Damage Frequency

Initiating Event	CDF (Per Year)	% Contribution to CDF
Loss of Offsite Power	7.73×10^{-5}	32.6
Transients	5.80×10^{-6}	24.5
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Total CDF (internal events)	**2.37×10^{-5}**	**100**

The probability of a super solar storm of the 1859 or 1921 size is about 1/100 years or 1 %/year. This size storm could lead to a continental wide, long term (many months) outage of the bulk power grid because of damage to all the U.S. step-up transformers. This damaged would be similar to the damage that occurred at Salem New Jersey in 1989 during a fairly mild solar storm. With such an outage, the emergency generators (that drive the cooling pumps) fuel supply could run out and may not be replaced because all the commercial fuel suppliers would be out of fuel as well due to the failure of the electrical pumps. Without fuel for the cooling pumps, the core damage frequency (CDF) appears to be several orders larger that the CDF given in the table 5-2. Perhaps s solar storm initiating event should be included in all the final EIS documents including the Salem and Hope Creek..

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