



Palo Verde Nuclear
Generating Station

William E. Ide
Vice President
Nuclear Production

TEL (623) 393-6116
FAX (623) 393-6077

Mail Station 7602
P.O. Box 52034
Phoenix, AZ 85072-2034

192-01057-WEI/DGM
October 20, 1999

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-37
Washington, DC 20555-0001

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket No. STN 50-528, 50-529, 50-530
License No. NPF-41, NPF-51, NPF-74
Notification of Unusual Event due to Hector Mine Earthquake
Special Report 1-99-001-00

Attached please find Special Report 1-99-001-00 which has been prepared and submitted pursuant to Technical Requirements Manual T3.3.103 (Seismic Monitoring) Required Action C.3 to "submit a Special Report to the Commission describing the magnitude, frequency spectrum, and resultant effect upon facility features important to safety" within 10 days.

In accordance with 10 CFR 50.4, a copy of this Special Report is also forwarded to the NRC Region IV Regional Administrator and the NRC resident inspector.

No commitments are being made to the NRC by this letter.

This Special Report also satisfies the PVNGS Emergency Plan Implementing Procedures requirement that a written summary of a Notification of Unusual Event (NUE) is to be provided to state and local offsite authorities following the termination of an emergency classification. The attached Special Report discusses the conditions surrounding an NUE classification (and immediate termination) for a seismic event that occurred on October 16, 1999.

If you have any questions, please contact Daniel G. Marks, Section Leader, Nuclear Regulatory Affairs, at (623) 393-6492.

Sincerely,

2800 67

WEI/DGM/dgm

Attachment

cc:

Arizona Division of Emergency Management
5636 East McDowell Road
Phoenix, Arizona 85008

Arizona Radiation Regulatory Agency
4814 South 40th Street
Phoenix, AZ 85040
Arizona Division of Emergency Services
Notification of Unusual Event

Arizona Department of Public Safety
P.O. Box 6638
Phoenix, AZ 85005 (2101 West Encanto Blvd.)

Maricopa County Sheriff's Office
102 West Madison
Phoenix, AZ

Maricopa County Department of Emergency Management
2035 North 52nd Street
Phoenix, AZ 85008

E. W. Merschoff
Regional Administrator
U. S. Nuclear Regulatory Commission, Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011

J. M. Moorman
Senior Resident Inspector
U. S. Nuclear Regulatory Commission
Palo Verde Mail Station 7393

M. B. Fields
Palo Verde Project Manager
U. S. Nuclear Regulatory Commission
Mail Stop 4 D7
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2738

Palo Verde Nuclear Generating Station Unit 1, 2 and 3

Notification of Unusual Event

Docket No. STN 50-528, 50-529, 50-530

License No. NPF-41, NPF-51, NPF-74

Special Report 1-99-001-00

On October 16, 1999, at 03:05 MST in Palo Verde Unit 1, the Shift Manager declared (and immediately exited due to the event being over) a Notification of an Unusual Event applicable to all three units due to a seismic event.

On October 16, 1999, at approximately 02:47 MST, an earthquake, referred to as the "Hector Mine Earthquake", of approximate magnitude 7.0 occurred, its epicenter located about 32 miles north of Joshua Tree, California. Joshua Tree, California is located approximately 220 miles west of the Palo Verde Nuclear Generating Station. At approximately 02:48 MST, the vibratory ground motion reached and actuated the Palo Verde Seismic Monitoring Instrumentation switches. Specifically, the strong motion accelerometer trigger located in the Unit 1 containment building tendon gallery exceeded the threshold value of 0.01g. The vibratory ground motion also was felt by personnel in all three Palo Verde control rooms. Operations personnel immediately retrieved data from the actuated instrument and performed an analysis to determine the magnitude of the vibratory ground motion. Initial analysis of the Seismic Monitoring Instrumentation tape recordings completed at approximately 03:05 MST indicated a seismic event of 0.015g. This is well below the magnitude of the 0.10g spectra Operating Basis Earthquake (OBE) and the 0.20g spectra Safe Shutdown Earthquake (SSE). Based on the validation of the earthquake per the Emergency Action Level 6-6 Technical Bases, the Unit 1 Shift Manager declared (and immediately exited due to the event being over) a Notification of an Unusual Event (NUE) applicable to all three units due to a seismic event.

Following declaration of the NUE, the Maricopa County Sheriff's Office and the Arizona Department of Public Safety were notified at approximately 03:13 MST via the Notification and Alert Network (NAN). The Palo Verde Emergency Coordinator recommended that no protective actions be taken. No protective actions were implemented by state or county agencies. The U. S. Nuclear Regulatory Commission was notified at 03:53 MST via the Emergency Notification System (ENS). The notification criteria for the ENS notification were 10 CFR 50.72(a)(1)(i) due to the declaration of an Emergency Class and 10 CFR 50.72(b)(1)(iii) due to the natural phenomenon that poses an actual threat to the safety of the nuclear power plant. Further analysis of the seismic data concluded the measured motions of structures and components were less than or equal to 14% of the OBE and should have no effect upon facility features important to safety. Based on the low magnitude of the vibratory ground motion and satisfactory plant walkdowns, an actual threat to safety did not exist. A follow-up ENS notification on October 17, 1999 at 22:00 MST retracted criterion 10 CFR 50.72(b)(1)(iii). The initial ENS notification stated a press release was expected to be made. No media interest existed, therefore no press release was made.

At the time of the earthquake, Unit 1 was conducting a refueling outage, at 0% power with all fuel assemblies offloaded from the reactor vessel to the spent fuel pool. Units 2 and 3 were

operating at approximately 100% power in Mode 1. Plant conditions remained unchanged by the event. Operations personnel performed an immediate walkdown of plant equipment. No abnormalities caused by the seismic event were observed. There were no structures, systems, or components that were inoperable that contributed to this event. There were no failures that rendered a train of a safety system inoperable and no failures of components with multiple functions were involved. No engineered safety feature (ESF) actuations occurred and none were required. The event did not result in any challenges to the fission product barriers or result in any releases of radioactive materials. The event did not adversely affect the safe operation of the plant or health and safety of the public.

This Special Report also satisfies the Technical Requirements Manual T3.3.103 (Seismic Monitoring) Required Action C.3 to "submit a Special Report to the Commission describing the magnitude, frequency spectrum, and resultant effect upon facility features important to safety" within 10 days. The following details are provided to fulfill Required Action C.3:

The data from the seismic instrumentation was played back, producing accelerograms and response spectra for channels 2,3,4,5,and 6. In addition, the channel 1 data, which had been evaluated during the Level 1 analysis, was reviewed, and the maximum acceleration for channel 1 was increased to 0.02 g's. The following table summarizes the results:

Accelerograms:

Channel	Location	Max Horizontal Acceleration (g's)	Horizontal – Ratio to OBE DBR	Max Vertical Acceleration (g's)	Vertical – Ratio to OBE DBR
XT-1	Tendon Gallery Floor	0.02	0.11	0.0075	0.04
XT-2	RCP motor	0.0275	0.14	0.01	0.06
XT-3	Steam Generator Base	0.0175	0.10	0.015	0.09
XT-4	Control Building Floor	0.0125	0.07	0.0075	0.04
XT-5	Auxiliary Building Floor	0.0175	0.09	0.0075	0.05

Note that Channel 1 is the channel used in the Level 1 evaluation and its maximum acceleration value is used to determine if a seismic event has occurred and needs to be evaluated (PVNGS procedure 79IS-9SM01, B1.5.1.3). The response spectra from this location is used to determine if the Operating Basis Earthquake (OBE) has been exceeded (PVNGS procedure 79IS-9SM01, B1.6.2.4). The ratio of the maximum acceleration to the Operating Basis Earthquake Design Basis Response is also given to show the size of the event relative to the OBE Event at the various locations. Most locations are less than 10%. The highest acceleration and percentage is on the RCP Motor sensor, which is expected because of the way it is mounted.

Response Spectra:

The response spectra showed no accelerations above OBE, except sensor XT-3 (steam generator base) in the vertical direction. Review of the data indicates that this direction on this channel suffered some sort of instrument problem and the data is not credible. This is based on comparison of the XT-3 response spectra to the spectrograph, to the other directions, and to the other locations, including the free field sensor. Frequency spectra are included in Table 1.

Conclusion:

The measured motions of structures and components are less than or equal to 14% of the OBE and should have no effect upon facility features important to safety.

Table 1 - Frequency Spectrum
Channel XT-1, Tendon Gallery Floor

Vertical		Horizontal (East-West)		Horizontal (North South)	
Frequency (Hz)	Acceleration (g's)	Frequency (Hz)	Acceleration (g's)	Frequency (Hz)	Acceleration (g's)
32.0	.00	32.0	.00	32.0	.01
30.4	.00	30.4	.00	30.4	.01
28.8	.01	28.8	.01	28.8	.01
27.2	.00	27.2	.00	27.2	.01
25.6	.00	25.6	.00	25.6	.01
24.0	.01	24.0	.00	24.0	.01
22.4	.01	22.4	.00	22.4	.01
20.8	.00	20.8	.00	20.8	.01
19.2	.00	19.2	.00	19.2	.01
17.6	.01	17.6	.00	17.6	.01
16.0	.01	16.0	.00	16.0	.01
15.2	.01	15.2	.00	15.2	.01
14.4	.01	14.4	.01	14.4	.01
13.6	.01	13.6	.00	13.6	.01
12.8	.01	12.8	.00	12.8	.01
12.0	.00	12.0	.00	12.0	.01
11.2	.00	11.2	.00	11.2	.01
10.4	.00	10.4	.00	10.4	.01
9.6	.00	9.6	.00	9.6	.01
8.8	.00	8.8	.00	8.8	.01
8.0	.00	8.0	.00	8.0	.01
7.6	.00	7.6	.00	7.6	.01
7.2	.00	7.2	.00	7.2	.01
6.8	.00	6.8	.00	6.8	.01
6.4	.00	6.4	.00	6.4	.01
6.0	.00	6.0	.00	6.0	.01
5.6	.00	5.6	.00	5.6	.01
5.2	.00	5.2	.00	5.2	.01
4.8	.00	4.8	.00	4.8	.01
4.4	.00	4.4	.00	4.4	.01
4.0	.01	4.0	.01	4.0	.01
3.8	.00	3.8	.01	3.8	.01
3.6	.00	3.6	.01	3.6	.01
3.4	.00	3.4	.00	3.4	.00
3.2	.01	3.2	.00	3.2	.01
3.0	.01	3.0	.00	3.0	.01
2.8	.01	2.8	.01	2.8	.02
2.6	.02	2.6	.01	2.6	.02
2.4	.03	2.4	.01	2.4	.02
2.2	.03	2.2	.00	2.2	.01
2.0	.02	2.0	.01	2.0	.02
1.9	.02	1.9	.01	1.9	.02
1.8	.02	1.8	.03	1.8	.04
1.7	.01	1.7	.03	1.7	.04
1.6	.01	1.6	.04	1.6	.05
1.5	.00	1.5	.05	1.5	.06
1.4	.01	1.4	.06	1.4	.07
1.3	.01	1.3	.06	1.3	.07
1.2	.02	1.2	.04	1.2	.05
1.1	.01	1.1	.03	1.1	.03
1.0	.00	1.0	.02	1.0	.02

Table 1 - Frequency Spectrum
Channel XT-2, RCP Motor

Vertical		Horizontal (East-West)		Horizontal (North South)	
Frequency (Hz)	Acceleration (g's)	Frequency (Hz)	Acceleration (g's)	Frequency (Hz)	Acceleration (g's)
32.0	.00	32.0	.01	32.0	.03
30.4	.00	30.4	.01	30.4	.03
28.8	.01	28.8	.02	28.8	.04
27.2	.02	27.2	.01	27.2	.03
25.6	.03	25.6	.01	25.6	.03
24.0	.02	24.0	.02	24.0	.03
22.4	.01	22.4	.02	22.4	.03
20.8	.00	20.8	.02	20.8	.04
19.2	.00	19.2	.02	19.2	.04
17.6	.00	17.6	.04	17.6	.05
16.0	.00	16.0	.08	16.0	.05
15.2	.00	15.2	.09	15.2	.05
14.4	.00	14.4	.09	14.4	.06
13.6	.00	13.6	.08	13.6	.06
12.8	.01	12.8	.06	12.8	.07
12.0	.01	12.0	.04	12.0	.14
11.2	.01	11.2	.03	11.2	.17
10.4	.00	10.4	.01	10.4	.15
9.6	.00	9.6	.00	9.6	.07
8.8	.00	8.8	.00	8.8	.05
8.0	.00	8.0	.00	8.0	.04
7.6	.00	7.6	.00	7.6	.03
7.2	.00	7.2	.00	7.2	.03
6.8	.00	6.8	.00	6.8	.01
6.4	.00	6.4	.00	6.4	.02
6.0	.00	6.0	.00	6.0	.02
5.6	.00	5.6	.00	5.6	.03
5.2	.00	5.2	.00	5.2	.02
4.8	.00	4.8	.00	4.8	.02
4.4	.00	4.4	.00	4.4	.02
4.0	.00	4.0	.00	4.0	.02
3.8	.00	3.8	.00	3.8	.02
3.6	.00	3.6	.00	3.6	.02
3.4	.00	3.4	.00	3.4	.01
3.2	.00	3.2	.01	3.2	.02
3.0	.00	3.0	.00	3.0	.02
2.8	.00	2.8	.00	2.8	.03
2.6	.00	2.6	.00	2.6	.03
2.4	.01	2.4	.02	2.4	.03
2.2	.01	2.2	.03	2.2	.05
2.0	.01	2.0	.03	2.0	.07
1.9	.01	1.9	.03	1.9	.07
1.8	.01	1.8	.03	1.8	.07
1.7	.01	1.7	.01	1.7	.06
1.6	.01	1.6	.02	1.6	.06
1.5	.01	1.5	.04	1.5	.07
1.4	.01	1.4	.07	1.4	.08
1.3	.01	1.3	.07	1.3	.07
1.2	.01	1.2	.04	1.2	.05
1.1	.00	1.1	.03	1.1	.03
1.0	.00	1.0	.02	1.0	.02

Table 1 - Frequency Spectrum Channel XT-3, Steam Generator Base					
Vertical		Horizontal (East-West)		Horizontal (North South)	
Frequency (Hz)	Acceleration (g's)	Frequency (Hz)	Acceleration (g's)	Frequency (Hz)	Acceleration (g's)
32.0	.27	32.0	.04	32.0	.04
30.4	.27	30.4	.04	30.4	.04
28.8	.28	28.8	.04	28.8	.04
27.2	.27	27.2	.04	27.2	.04
25.6	.27	25.6	.04	25.6	.04
24.0	.28	24.0	.04	24.0	.05
22.4	.29	22.4	.04	22.4	.05
20.8	.29	20.8	.04	20.8	.06
19.2	.28	19.2	.04	19.2	.06
17.6	.28	17.6	.04	17.6	.05
16.0	.28	16.0	.04	16.0	.04
15.2	.27	15.2	.03	15.2	.04
14.4	.27	14.4	.03	14.4	.05
13.6	.24	13.6	.03	13.6	.04
12.8	.25	12.8	.04	12.8	.04
12.0	.25	12.0	.03	12.0	.04
11.2	.28	11.2	.03	11.2	.04
10.4	.29	10.4	.03	10.4	.04
9.6	.29	9.6	.03	9.6	.04
8.8	.28	8.8	.03	8.8	.04
8.0	.28	8.0	.03	8.0	.04
7.6	.27	7.6	.03	7.6	.04
7.2	.28	7.2	.03	7.2	.04
6.8	.28	6.8	.03	6.8	.04
6.4	.29	6.4	.03	6.4	.04
6.0	.29	6.0	.02	6.0	.04
5.6	.29	5.6	.02	5.6	.04
5.2	.27	5.2	.02	5.2	.04
4.8	.27	4.8	.03	4.8	.04
4.4	.28	4.4	.03	4.4	.04
4.0	.29	4.0	.03	4.0	.04
3.8	.28	3.8	.02	3.8	.03
3.6	.28	3.6	.02	3.6	.03
3.4	.28	3.4	.02	3.4	.04
3.2	.29	3.2	.03	3.2	.05
3.0	.28	3.0	.03	3.0	.05
2.8	.28	2.8	.03	2.8	.04
2.6	.26	2.6	.03	2.6	.03
2.4	.27	2.4	.04	2.4	.04
2.2	.27	2.2	.04	2.2	.04
2.0	.28	2.0	.05	2.0	.06
1.9	.28	1.9	.05	1.9	.06
1.8	.28	1.8	.06	1.8	.07
1.7	.28	1.7	.06	1.7	.06
1.6	.28	1.6	.06	1.6	.06
1.5	.27	1.5	.08	1.5	.06
1.4	.27	1.4	.01	1.4	.07
1.3	.27	1.3	.11	1.3	.06
1.2	.28	1.2	.09	1.2	.05
1.1	.28	1.1	.07	1.1	.04
1.0	.28	1.0	.05	1.0	.04

Note: Review of the data indicates that the vertical direction on channel XT-3 (steam generator base) suffered some sort of instrument problem and the data is not credible. This is based on the comparison of the XT-3 response spectra to the spectrograph, to the other directions, and to the other locations, including the free field sensor.

Table 1 - Frequency Spectrum
Channel XT-4, Control Building Floor

Vertical		Horizontal (East-West)		Horizontal (North South)	
Frequency (Hz)	Acceleration (g's)	Frequency (Hz)	Acceleration (g's)	Frequency (Hz)	Acceleration (g's)
32.0	.01	32.0	.00	32.0	.01
30.4	.01	30.4	.00	30.4	.01
28.8	.01	28.8	.00	28.8	.01
27.2	.01	27.2	.00	27.2	.01
25.6	.01	25.6	.00	25.6	.01
24.0	.01	24.0	.00	24.0	.01
22.4	.01	22.4	.00	22.4	.01
20.8	.01	20.8	.00	20.8	.02
19.2	.01	19.2	.00	19.2	.02
17.6	.00	17.6	.00	17.6	.01
16.0	.00	16.0	.00	16.0	.01
15.2	.00	15.2	.00	15.2	.01
14.4	.00	14.4	.00	14.4	.01
13.6	.00	13.6	.00	13.6	.01
12.8	.00	12.8	.00	12.8	.01
12.0	.00	12.0	.00	12.0	.01
11.2	.00	11.2	.00	11.2	.01
10.4	.00	10.4	.00	10.4	.01
9.6	.00	9.6	.00	9.6	.01
8.8	.00	8.8	.00	8.8	.01
8.0	.00	8.0	.00	8.0	.01
7.6	.00	7.6	.00	7.6	.01
7.2	.00	7.2	.00	7.2	.01
6.8	.00	6.8	.00	6.8	.01
6.4	.00	6.4	.00	6.4	.01
6.0	.00	6.0	.00	6.0	.01
5.6	.00	5.6	.00	5.6	.01
5.2	.00	5.2	.00	5.2	.01
4.8	.00	4.8	.00	4.8	.01
4.4	.00	4.4	.00	4.4	.01
4.0	.00	4.0	.00	4.0	.01
3.8	.00	3.8	.00	3.8	.00
3.6	.01	3.6	.00	3.6	.01
3.4	.01	3.4	.00	3.4	.01
3.2	.01	3.2	.00	3.2	.02
3.0	.01	3.0	.00	3.0	.01
2.8	.01	2.8	.01	2.8	.01
2.6	.00	2.6	.01	2.6	.01
2.4	.01	2.4	.01	2.4	.02
2.2	.01	2.2	.01	2.2	.02
2.0	.02	2.0	.02	2.0	.02
1.9	.02	1.9	.02	1.9	.02
1.8	.02	1.8	.03	1.8	.03
1.7	.01	1.7	.02	1.7	.03
1.6	.01	1.6	.02	1.6	.04
1.5	.01	1.5	.02	1.5	.04
1.4	.01	1.4	.05	1.4	.05
1.3	.01	1.3	.07	1.3	.05
1.2	.01	1.2	.06	1.2	.04
1.1	.00	1.1	.04	1.1	.03
1.0	.00	1.0	.02	1.0	.02

Table 1 - Frequency Spectrum
Channel XT-5, Auxiliary Building Floor

Vertical		Horizontal (East-West)		Horizontal (North South)	
Frequency (Hz)	Acceleration (g's)	Frequency (Hz)	Acceleration (g's)	Frequency (Hz)	Acceleration (g's)
32.0	.00	32.0	.10	32.0	.04
30.4	.00	30.4	.09	30.4	.04
28.8	.00	28.8	.08	28.8	.05
27.2	.00	27.2	.07	27.2	.04
25.6	.00	25.6	.06	25.6	.04
24.0	.00	24.0	.06	24.0	.04
22.4	.00	22.4	.06	22.4	.04
20.8	.00	20.8	.05	20.8	.04
19.2	.00	19.2	.05	19.2	.04
17.6	.00	17.6	.04	17.6	.04
16.0	.00	16.0	.05	16.0	.04
15.2	.00	15.2	.05	15.2	.03
14.4	.00	14.4	.06	14.4	.03
13.6	.00	13.6	.05	13.6	.02
12.8	.00	12.8	.05	12.8	.03
12.0	.00	12.0	.05	12.0	.03
11.2	.00	11.2	.06	11.2	.04
10.4	.00	10.4	.06	10.4	.04
9.6	.00	9.6	.06	9.6	.04
8.8	.00	8.8	.05	8.8	.04
8.0	.00	8.0	.05	8.0	.04
7.6	.00	7.6	.05	7.6	.04
7.2	.00	7.2	.05	7.2	.04
6.8	.00	6.8	.05	6.8	.04
6.4	.00	6.4	.05	6.4	.04
6.0	.00	6.0	.05	6.0	.04
5.6	.00	5.6	.05	5.6	.04
5.2	.00	5.2	.05	5.2	.04
4.8	.00	4.8	.05	4.8	.04
4.4	.00	4.4	.05	4.4	.04
4.0	.00	4.0	.05	4.0	.04
3.8	.00	3.8	.05	3.8	.04
3.6	.00	3.6	.05	3.6	.04
3.4	.00	3.4	.05	3.4	.04
3.2	.01	3.2	.05	3.2	.04
3.0	.00	3.0	.05	3.0	.04
2.8	.00	2.8	.05	2.8	.04
2.6	.01	2.6	.05	2.6	.03
2.4	.02	2.4	.05	2.4	.04
2.2	.02	2.2	.04	2.2	.04
2.0	.02	2.0	.05	2.0	.05
1.9	.02	1.9	.06	1.9	.05
1.8	.02	1.8	.07	1.8	.06
1.7	.01	1.7	.06	1.7	.06
1.6	.01	1.6	.06	1.6	.06
1.5	.01	1.5	.08	1.5	.06
1.4	.01	1.4	.10	1.4	.06
1.3	.01	1.3	.10	1.3	.05
1.2	.01	1.2	.08	1.2	.05
1.1	.00	1.1	.07	1.1	.04
1.0	.00	1.0	.06	1.0	.04