UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of	)	
	)	
CLEVELAND ELECTRIC	)	Docket Nos. 50-440 OL
ILLUMINATING COMPANY, ET AL.	)	50-441 OL
	)	
(Perry Nuclear Power Plant,	)	
Units 1 and 2)	)	

AFFIDAVIT OF PHYLLIS
SOBEL AND LEON REITER

I, Phyllis Sobel, being duly sworn do depose and state as follows:

I am employed as a seismologist in the Division of Boiling Water Reactor Licensing, Engineering Branch, of the Nuclear Regulatory Commission. A statement of my professional qualifications is attached.

I, Leon Reiter, being duly sworn, do depose and state as follows:

I am employed as a senior reliability and risk analyst in the Division of Safety Review and Oversight, Reliability and Risk Assessment Branch, of the Nuclear Regulatory Commission. A statement of my professional qualifications is attached.

The purpose of our affidavit is to respond to assertions concerning the January 31, 1986 earthquake in northeast Ohio contained in a motion to reopen the record filed on February 3, 1986 by Ohio Citizens for Responsible Energy (OCRE).

1. We have read the OCRE Motion and conclude that no significant safety issue is raised by the contents of the motion for the reasons explained as follows.

2. On January 31, 1986 at 11:46 a.m. EST a magnitude 5.0 (m_{blg}) earthquake occurred about 10 miles south of the Perry plant in northeastern Ohio. The U.S. Geological Survey (USGS) reports the epicenter was at 41.65°N and 81.16°W. The maximum Modified Mercalli (MM) intensity of the earthquake is VI. At least five research teams deployed portable seismometers and accelerometers near the epicenter and near the Perry plant to record aftershocks. Several aftershocks were recorded; the largest was about a magnitude 2.4 on February 6. The depth of the main event was probably shallow, since the aftershocks were 1 to 6 miles deep.

3. The January 31 earthquake triggered the in-plant seismic monitoring instruments. Some of the recorded motions at high frequencies (above 15 hz) exceeded the Operating Basis Earthquake (OBE) and the Safe Shutdown Earthquake (SSE). The earthquake motion recorded at the reactor building foundation was of short duration (about one second) and contained predominantly high frequency elements. However, these exceedances were all recorded by instruments on plant structures; the earthquake was not recorded in the free-field outside the plant. The SSE anchor developed for nuclear plants is a high frequency anchor point for a design response spectrum (a frequency dependent description of earthquake motion useful to design engineers). For most frequencies of the January earthquake data, the design spectrum of the SSE was conservative. At high frequencies (above 15 hz) there were some inplant recordings that showed exceedances of the OBE and SSE.

4. To assess what part of this high frequency exceedance was due to the earthquake source as distinguished from local site conditions or the

response of the structure, we have asked the utility and the USGS to provide and assess all available ground motion recordings near the plant site and in the epicentral area of the January 31 event and its aftershocks.

5. It is not unusual in an earthquake to have high amplitude high frequency peak accelerations of limited duration. In recent SERs for eastern U.S. sites (for example, Seabrook) high frequency ground motions were discussed. Evaluations of eastern U.S. data suggest that the presence of high frequency ground motion is more likely a local site phenomenon (conditions at the recording site) than a source condition. These high frequency peak accelerations have not been used and should not be used in scaling and applying Regulatory Guide 1.60 design spectra because they are usually of short duration and little energy and are not representative of spectral response at the lower more significant frequencies. Preliminary analysis of data from the January 31 earthquake aftershocks indicates that the recorded ground motions in the free-field include high frequencies similar to ground motions recorded at New Brunswick, Arkansas, Monticello Reservoir and Anza, California. As at Perry these earlier events did not result in any significant damage.

6. The Perry site is located in the Central Stable Region tectonic province. Most of the seismic Category I structures, including the reactor building, are founded on Upper Devonian Chagrin shale bedrock. Paleozoic sedimentary rock formations about 5,000 feet thick overlie PreCambrian crystalline basement. Pleistocene glaciation induced localized shallow faults and folds in the shale strata in the site vicinity. There are no known capable faults in the site region. Seismic activity in the site region is typical of that in the Central Stable Region.

7. Since earthquake activity around the vicinity of the site is not substantially different from that of the Central Stable Region, the staff concluded in the SER that the controlling earthquake for the Perry site is the largest earthquake which is not associated with a tectonic structure, i.e., a magnitude 5.3 event similar to past earthquakes in Anna, Ohio and Sharpsburg, Kentucky.

8. In the OL review the staff evaluated the site ground motion produced by a nearby magnitude 5.3 event. The free-field ground motion at the foundation level of the Category I structures was compared to the Perry SSE. The Perry SSE (a Regulatory Guide 1.60 spectrum anchored to 0.15g) was found acceptable since it exceeded the 84th percentile ground motion spectrum from a set of recordings from magnitude 5.3 ± 0.5 events. The accelerograms were recorded at an epicentral distance of less than 16 miles (25 km) and at sites with rock foundation conditions similar to the Perry site. The applicant used Regulatory Guide 1.60 design spectra anchored to 0.075g for the OBE. This represents half the SSE acceleration and is consistent with Appendix A to 10 CFR Part 100.

9. As previously indicated, the January 31, 1986 earthquake was magnitude 5.0 and maximum MM intensity VI. The size and proximity of this event are consistent with observations of historical seismicity in the Central Stable Region. As discussed earlier, the staff had compared the Perry SSE design spectrum to a larger event (magnitude 5.3) occurring near the plant.

10. To date there has been no association established with a known geological structure for the recent earthquake. The utility is continuing to examine geological, geophysical and seismic data in the epicentral area

for any possible associated structures. However, a preliminary report of geological investigations done by the utility consultants in the epicentral area of the earthquakes indicates no significant tectonic structures were observed in bedrock or overlying surficial deposits. As part of ongoing studies, the information to be provided by the utility and other researchers will be examined with respect to statements in the SER.

11. Because the staff had already assessed the effects of a larger earthquake (magnitude 5.3) at the Perry site and because ground motions at short durations and high frequencies have been recorded in other events and did not result in significant damage, we conclude that no significant safety issue is raised by the allegations made in OCRE's motion.

We attest the foregoing is true and accurate to the best of our knowledge and belief.

Phyllis Sobel
Engineering Branch
Division of Boiling Water
Reactor Licensing

Leon Reiter
Reliability and Risk Assessment
Branch
Division of Safety Review and
Oversight

Subscribed and sworn to before me
this 7th day of March, 1986.

Notary Public

My commission expires: My Commission Expires July 1 1986

PHYLLIS SOBEL, PH.D.
ENGINEERING BRANCH
DIVISION OF BWR LICENSING
U.S. NUCLEAR REGULATORY COMMISSION

My name is Phyllis Sobel and I am employed as a Geophysicist in the Engineering Branch, Division of BWR Licensing, Office of Nuclear Reactor Regulation, Washington, D. C. 20555.

PROFESSIONAL QUALIFICATIONS

In 1969 I received a B.S. degree in Geological Sciences from the Pennsylvania State University. I also pursued graduate studies at Princeton University and the University of Minnesota. In 1978 I received a Ph.D. degree in Geophysics from the University of Minnesota.

From 1970 to 1973 I was a teaching assistant and research assistant at the University of Minnesota. I taught undergraduate laboratories in physical geology, historical geology, and oceanography courses. My activity as a research assistant was in the development and use of a program to simulate marine magnetic anomalies. My interests in graduate school included all areas of geophysics, structural geology, and marine geology. My dissertation was a study of seismic phases reflecting off structures below the Earth's crust under several geographic regions.

From 1973 to 1977 I was employed by Teledyne Geotech in Alexandria, Virginia as a research geophysicist. At this corporation's research laboratory I worked on a variety of research problems in seismology related to the detection of nuclear explosions, including the use of filters to extract signals from seismograms, the propagation of Rayleigh waves through heterogeneities, and the characteristics of earthquakes in areas of proposed underground nuclear testing in Asia.

I am a member of the American Geophysical Union and the Seismological Society of America. I have authored or co-authored ten papers published as Teledyne Geotech reports or in the Bulletin of the Seismological Society of America. I have authored or co-authored two papers presented at meetings of the Seismological Society of America.

From October 1977 to March 1978 I was employed as a seismologist by the NRC Office of Standards Development in the revision and development of new regulatory guides and standards. Since March 1978 I have been employed by the Office of Nuclear Reactor Regulation in the evaluation of the seismological and geophysical data submitted to the NRC in support of a proposed seismic design basis for nuclear facilities. In addition, I have supervised technical assistance contracts related to generic problems found in the licensing process.

LEON REITER
SENIOR RELIABILITY AND RISK ANALYST
RELIABILITY AND RISK ASSESSMENT BRANCH
DIVISION OF SAFETY REVIEW AND OVERSIGHT
U. S. NUCLEAR REGULATORY COMMISSION

My name is Leon Reiter. I presently reside at 1960 Dundee Road, Rockville, Maryland 20850 and am employed as a Senior Reliability and Risk Analyst in the Reliability and Risk Assessment Branch, Division of Safety Review and Oversight, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

PROFESSIONAL QUALIFICATIONS

I received a Bachelor of Arts degree in Geology from Brooklyn College in 1958, a Master of Science degree in Geology (Geophysics) from the University of Michigan in 1968, a Master of Arts degree in Mathematics from the University of Michigan in 1970 and a Ph.D. in Geology (Geophysics) from the University of Michigan in 1971. In the year following receipt of my Ph.D. I was a National Science Foundation Post-Doctoral Fellow at the Institute of Geophysics and Planetary Geophysics in La Jolla, California. From 1972 to 1976 I was an Assistant Professor of Geophysics at the University of Oklahoma. During the summer of 1975 I was a visiting scientist of the U.S. Geological Survey National Center for Earthquake Research in Menlo Park, California. I joined the NRC in August, 1976 as a Seismologist and in August 1979 I became Leader of the Seismology Section in the Geosciences Branch of the Division of Engineering. In December 1985, I became a Senior Reliability and Risk Analyst in the Reliability and Risk Assessment Branch of the Division of Safety Review and Oversight.

My research during my academic career has included the areas of crustal exploration, seismic wave attenuation, midcontinent seismicity and tectonics, earthquake prediction and the application of seismic techniques to engineering problems. At NRC I have been actively involved in review of sites for nuclear facilities in all parts of the United States and in several foreign countries. I have also taken a lead responsibility for studies in the fields of strong motion seismology, near-field ground motion, and probabilistic risk assessment.

I am a member of the American Geophysical Union, the Seismological Society of America, the Society of Exploration Geophysicists and the Earthquake Engineering Research Institute. I have served as a member of the Plate Interiors Working Group of the U.S. Geodynamics Committee, the Interagency Committee on Seismic Safety in Construction and the Panel on National Regional and Local Seismograph Networks and the Panel on Seismic Hazard Analysis of the National Research Council-National Academy of Sciences. I have authored or co-authored papers published in the Bulletin of the Seismological Society of America, the Journal of the Acoustical Society of America, and many conference proceedings.