UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

Docket No. 52-016

Calvert Cliffs-3 Nuclear Power Plant
Combined Construction and License Application

EXPERT DECLARATION BY DR. EDWIN S. LYMAN IN SUPPORT OF PETITIONERS' STANDING TO INTERVENE IN THIS PROCEEDING

Under penalty of perjury, I, Dr. Edwin S. Lyman, declare as follows:

1. I am a Senior Staff Scientist with the Global Security Program at the Union of Concerned Scientists, 1825 K Street, NW, Suite 800, Washington, D.C. 20006. My education and experience are described in my curriculum vitae, which is included as an attachment to my declaration.

2. I am an expert in the technical analysis of safety, security and environmental issues related to nuclear facilities. I hold a Ph.D., a master's degree in science, and a bachelor's degree in physics. For over fifteen years, I have conducted research on security and environmental issues associated with the management of nuclear materials and the operation of nuclear power plants. My research has included the safety and environmental risks posed by the proposed designs for the next generation of U.S. reactors, including the U.S. Evolutionary Power Reactor (U.S. EPR). Recently, I published an article on this topic in the Bulletin of the Atomic Scientists. A list of my publications is included in my attached curriculum vitae.

3. I am generally familiar with the severe accident analysis contained in the U.S. EPR design certification application. In addition, I have reviewed the arguments regarding the standing of the Petitioners to request a hearing in this proceeding, which were made by Unistar Nuclear Operating Services, L.L.C. (Unistar) in Applicant's Answer to Petition to Intervene (December 15, 2008) ("Unistar Answer"), and the judicial opinions on which Unistar relies.

4. In characterizing the risk level that is sufficient to establish standing to participate in a legal case, Unistar's Answer makes a significant mathematical error by failing to use a common denominator in estimating the risk of injury as represented in the judicial decisions cited by Unistar. As a result of its mistakes, at page 17, Unistar incorrectly claims that "under contemporaneous standing jurisprudence," the increased risk of harm needed to establish injury-in-fact falls somewhere between 1 in 200,000 and 1 in 21 million. It then compares those values to the core damage frequency (CDF) and large

release frequency (LRF) of the U.S. EPR. This is not a valid comparison because the CDF and LRF are expressed as annual risks, whereas the injury risks that establish the limits of standing cited by Unistar are risks aggregated over one to two human lifetimes.

5. In *Natural Resources Defense Council, Inc. v. U.S. Environmental Protection Agency*, 440 F.3d 746, 484 (D.C. Cir. 2006) ("NRDC I"), the U.S. Court of Appeals for the D.C. Circuit found that a 1 in 21 million risk over a 145-year period (roughly two human lifetimes) was insufficient to establish standing. That opinion was withdrawn in 2006 U.S. App. LEXIS 22512 (D.C. Cir. 2006), and the Court revisited the risk issued in *Natural Resources Defense Council, Inc. v. U.S. Environmental Protection Agency*, 464 F.3d 1, 7 (D.C. Cir. 2006), *reh'g en banc denied,* 2007 U.S. App. LEXIS 3963 (D.C. Cir. Feb. 21, 2007) ("NRDC II"). In NRDC II, the Court found that a 1 in 200,000 *lifetime* risk was sufficient to establish standing.

6. A 1 in 200,000 lifetime risk corresponds to a 1 in 14 million annual risk for an average lifetime of 70 years. Thus the magnitude of an annual risk of a non-fatal skin cancer found by the court to be sufficient for standing in NRDC II was 1 in 14 million per year, or 7.14x10-8. In its Answer, Unistar gives an estimate for large release frequency for internal, at-power events of 2.6x10-8. There is almost no statistical difference between these two risk estimates because the two values are within a factor of three of each other, *i.e.*, are on the same order of magnitude. (Any difference that is equal to or less than a factor of three is considered to be within an order of magnitude.)

7. Thus, if the court in NRDC II believed that a 7.14x10-8 annual risk was sufficient to confer standing, it is reasonable to infer that a 2.6x10-8 risk would be sufficient to confer standing. Therefore, Petitioners should be given standing if the same quantitative standard is used as the standard used in NRDC II.

8. In any event, the actual risk from nuclear accidents is higher than estimated by Unistar. Unistar bases its risk estimate only on internal, at-power events, and neglects external events such as seismic events, low-power events and shutdown events. If one adjusts Unistar's estimated LRF of 2.6x10-8 to account for low-power and shutdown events (which have a Large Release Frequency [LRF] of 5.4x10-9 according to Areva's RAI response No. 22, supplement 3, revision 0), the LRF must be adjusted upward to 3.2x10-8. [Note: the Unistar brief was in error when it referred to these values as Large Early Release Frequencies (LERFs) and not Large Release Frequencies (LRFs).]

10. Accounting for seismic events, the SAMDA analysis in the Areva environmental report increases the CDF by 33%. The increase in LRF is most likely greater than this, because containment failure is more likely in some core damage scenarios caused by seismic events rather than internal events. But if we assume the same 33% increase in LRF, this brings the LRF to 4.3x10-8, or a 1 in 23 million annual risk, less than a factor of two below a risk of 1 in 14 million per year.

I declare, under penalty of perjury, that the factual statements above are true and correct to the best of my knowledge, and the expressions of opinion stated above are based on my best professional judgment.

Dr. Edwin S. Lyman

December 22, 2008
Corrected February 26, 2009