Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

March 8, 2005

Charles E. Ader, Director
Division of Risk Analysis and Applications
Office of Nuclear Regulatory Research
United States Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Ader:

By letter dated February 11, 2005, you transmitted a copy of a draft report entitled, "Station Blackout Risk Evaluation for Nuclear Power Plants," and extended UCS the opportunity for a peer review. UCS appreciates this opportunity to peer review this draft report and provides our comments via the attachment to this letter.

If you have any comments on or questions about the comments we provided, please contact me in UCS's Washington offices.

Sincerely,

David Lochbaum
Nuclear Safety Engineer

Attachment: UCS Comments on "Station Blackout Risk Evaluation for Nuclear Power Plants (Draft)" dated January 2005

UCS Comments on "Station Blackout Risk Evaluation for Nuclear Power Plants (Draft)" dated January 2005	
Section	**UCS Comment**
Abstract, page i	The Abstract states that the results in this report for core damage frequencies from station blackout are lower than previous estimates and singles out improved emergency diesel generator performance as an explanation for that reduction. However, the information contained in the report does not support that notion. Figure ES-1 (page x) shows the historical trend for loss of offsite power (LOOP) initiating event frequency from 1975 to now. Over that period, the trend resulted in a reduction from about 1.1E-01 to 3.3E-02, or a factor of about nearly 30. The first paragraph on page x states: "*SBO risk in terms of core damage can be thought of as the product of the LOOP frequency, the failure probability of the onsite emergency power system (EPS), and the composite failure probability of SBO coping features at a given plant.*" All things being equal, a 30-fold reduction in the LOOP frequency (i.e., Figure ES-1) should produce about a 30-fold reduction in the SBO risk. But.... Figure ES-5 (page xiii) plots the historical trend for SBO risk from 1975 to now. Over that period, the trend resulted in a reduction from about 2.6E-05 to 2.9E-6, or a factor of about 10. **The Abstract's exclusive credit to improved emergency diesel generator performance as the reason for the SBO risk reduction appears unsupported by the evidence.**
Executive Summary, page ix	The fifth paragraph states "*Risk [from station blackout] was evaluated for internal events during critical operation; risk from shutdown operation and external events was not addressed.*" This limited scope is non-conservative and contradicts the very reason this draft report was generated and actual industry experience. The fourth paragraph on page ix discusses the August 14, 2003, grid-related LOOP that affected nine U.S. nuclear power plants and states: "*As a result of that event, the NRC initiated a comprehensive program that included updating and re-evaluating LOOP frequencies and durations and SBO risk. This report is part of that overall program and focuses on SBO risk.*" **In other words, the August 14, 2003, blackout – an external event – prompted this re-assessment of station blackout risk that ignores the risk from external events. That makes no sense.** One of the U.S. nuclear power plants affected by the August 14, 2003, grid-related event was Davis-Besse. Davis-Besse was shut down at the time. It experienced more complications from the event (e.g., water hammer that damaged and disabled safety-related cooling equipment) than most of the reactors that were operating at the time of the blackout. The worst station

UCS Comments on "Station Blackout Risk Evaluation for Nuclear Power Plants (Draft)" dated January 2005	
Section	**UCS Comment**
	blackout event in U.S. nuclear plant history occurred on March 21, 1990, at the Vogtle nuclear plant when the reactor was shut down. **To summarily ignore the station blackout risk at reactors that are shut down seems ill-justified and unwarranted.** In addition, the evaluation totally ignores the risk from damage to irradiated fuel in the spent fuel pool resulting from a station blackout event. The coping durations for station blackout were calculated assuming offsite power and onsite emergency power availability as defined by the full-power (Mode 1) technical specifications. During refueling, there is often a minimum complement of offsite and onsite power sources below the level defined by the Mode 1 technical specifications. Consequently, the restoration times that factor into the coping durations are invalid and the station blackout periods may be longer than the coping durations. Long station blackout periods challenge times-to-boil of the spent fuel pool during refueling outages. NRC surveys of industry refueling practices in the wake of the Millstone Unit 1 problems in 1996 revealed times-to-boil of less than 24 hours during the early stages of refueling. **To summarily ignore the station blackout risk to spent fuel during refueling seems ill-justified and unwarranted.**
Glossary, page xxi	The Executive Summary (page ix, 5th paragraph) states that "*Risk [from station blackout] was evaluated for internal events during critical operation; risk from shutdown operation and external events was not addressed.*" The Glossary contains definitions for "*Extreme-weather-related loss of offsite power event*," "*Grid-related loss of offsite power event*," and "*Severe-weather-related loss of offsite power event*" – all sounding very much like external events that are supposedly not addressed. It is not clear what is meant by "external events was not addressed" in assessing station blackout risk. LOOP frequency is a factor addressed in the SBO risk calculation. LOOP frequencies account for events caused by weather and other external causes. A definition of those external events not being addressed should be added to the Glossary.
Section 2.1, page 3	A number of "enhancements" to the NRC's SPAR models are discussed in this section. The line item upgrades deal with modeling reactor coolant pump (RCP) seal leakage. It appears from the write-up in this section that SPAR models for Westinghouse reactors were affected more than Combustion Engineering reactors and that SPAR models for Babcock & Wilcox reactors and General Electric reactors were essentially unchanged.

UCS Comments on "Station Blackout Risk Evaluation for Nuclear Power Plants (Draft)" dated January 2005	
Section	**UCS Comment**
	To attempt to quantify the effect of the various SPAR model "enhancements," UCS compared the risk numbers from NUREG-1776[1] to the risk numbers from this draft report. Our findings: Plant Core Damage Frequency (CDF): The average plant-specific CDF in this draft report is 45 percent of the average plant-specific CDF in NUREG-1776. As expected from the "enhancements" to the SPAR models for Westinghouse and Combustion Engineering reactors, most of the plant CDF values for Westinghouse reactors in this report are about 10 percent of the plant CDF values in NUREG-1776. Most of the plant CDF values for Combustion Engineering reactors are about 30 percent of the plant CDF values in NUREG-1776. The plant CDF values for B&W and GE plants are essentially the same as reported in NUREG-1776. SBO Core Damage Frequency (CDF): There are large, unexplained differences between the SBO CDF values in this report and those in NUREG-1776. For example, the SBO CDF for Vermont Yankee in NUREG-1776 is 9.17E-07. But in this draft report, the SBO CDF is merely 8.44E-10. There's no evident, physical explanation for this three order of magnitude reduction. At the other extreme of the anomalies, the SBO CDF for Susquehanna Units 1&2 was 4.2E-11 in NUREG-1776. In this draft report, the SBO CDF mysteriously becomes 2.52E-07. There's no explanation given for this more than three order of magnitude increase. Overall, 84 of the 103 reactors have a lower SBO CDF in this draft report than in NUREG-1776 while 18 reactors have a higher SBO CDF per this draft report. One reactor (Fort Calhoun) had no SBO CDF specified in NUREG-1776. LOOP Initiating Event Frequency: The average plant-specific LOOP frequency in this draft report is roughly 4 times greater than the average plant-specific LOOP frequency in NUREG-1776. Ironically, the highest increase occurs at the Vogtle Unit 1& 2 reactors – the site of the worst SBO event to date. NUREG-1776 listed the LOOP frequency for Vogtle as 6.6E-04 while this report increased it to 3.31E-02, a whopping 5,000 percent increase! This draft report makes no mention of NUREG-1776 and contains no discussion on the reason for the humongous differences between the results from that report and this one. NUREG-1776 was issued by the NRC less than two years ago. It was issued in August 2003 – the very same time period as the grid event that prompted this report. Was NUREG-1776 obsolete was it rolled off the presses? Will another report 18 months from now also report plant CDF and SBO CDF values orders of magnitude higher

[1] W. S. Raughley, Nuclear Regulatory Commission, "Regulatory Effectiveness of the Station Blackout Rule," NUREG-1776, August 2003.

UCS Comments on "Station Blackout Risk Evaluation for Nuclear Power Plants (Draft)" dated January 2005	
Section	**UCS Comment**
	or lower than those reported in this draft report? Will this report supercede or replace NUREG-1776 or will people be able to cherry-pick the low or high risk values from both reports as needed to support whatever risk conclusion they've previously reached? **The NRC should not issue a final report unless it reconciles the mind-numbing differences in risk numbers reported herein and therein NUREG-1776. The two reports allegedly evaluate the same subject, but yield disparate and unexplained results.**
Section 2.1, page 3	The paragraph at the bottom of page 3 states that the NRC's SPAR models were updated using information from INPO's Equipment Performance and Information Exchange (EPIX) database. **The NRC should not rely on unverified, uncontrolled, secret information for its regulatory analyses.** INPO is not an NRC licensee. Therefore, INPO is not obligated to abide by the accuracy and completeness requirements in 10 CFR 50.9. NRC inspectors periodically audit component performance data collected by its licensees and not infrequently identifies errors in that data. But NRC inspectors do not audit INPO or INPO's collection of component performance data and maintenance of said data in EPIX. EPIX is neither publicly available nor periodically verified by the NRC to be an accurate, complete source of data. The information in EPIX is hardly more reliable than the output from a Ouija board absent means to ensure its validity.
Section 4.2, page 17	The final paragraph on page 17 states that information from INPO's EPIX database was used to update the NRC's SPAR models for emergency power system performance. As detailed above in the comment on Section 2.1, page 3, **the NRC should not rely on unverified, uncontrolled, secret information for its regulatory analyses.**