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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Second Draft NUREG-1150, Severe Accident Risks:
An Assessment for Five U.S. Nuclear Power Plants

The Illinois Department of Nuclear Safety (IDNS) hereby submits its comments and recommendations concerning NUREG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants, Second Draft for Peer Review." IDNS is the state agency responsible for implementing the Illinois Nuclear Safety Preparedness Program. This program consists of an assessment of potential accidents at nuclear power plants, their radiological consequences, and the necessary protective actions required to mitigate the effects of such accidents. Initiatives of the U.S. Nuclear Regulatory Commission (NRC), such as NUREG-1150, are important to IDNS's emergency preparedness and response program.

NUREG-1150 is a major re-evaluation of risk analysis assumptions, methods, and implications for U.S. nuclear power reactors. The methodology developed for NUREG-1150 is at least as important as the results obtained for the five plants analyzed in the second draft of NUREG-1150. The pending implementation of Generic Letter No. 88-20, calling for Individual Plant Examinations (IPEs) by the utilities, highlights the importance that the methodology in NUREG-1150 will have. From this perspective, IDNS sees five positive results of NUREG-1150:

(1) formalizing a method for eliciting expert opinions for use in Probabilistic Risk Assessments (PRAs);

(2) developing and applying simplified methods for analyzing external events, especially for fire and seismic events;

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(3) presenting detailed methods for guidance in conducting IPEs;

(4) developing and applying dependent failure methods and using a systematic search strategy for subtle failure mechanisms; and

(5) replacing the methods, data, and models found in the 1975 "Reactor Safety Study" (WASH-1400).

Although the "Reactor Safety Study" (WASH-1400) was completed almost fifteen years ago, it continues to be referenced by the NRC, utilities, and private individuals. NUREG-1150 will be an important new reference document because it is a state-of-the-art analysis. It should quickly supplant WASH-1400 as a reference document. IDNS sees three significant uses for NUREG-1150:

(1) re-examining and updating accident management strategies and emergency response planning;

(2) prioritizing NRC Generic Safety Issues and evaluating Safety goals; and

(3) improving the NRC's inspection program.

NRC's published reports are used daily by IDNS. NUREG-1150 will be used as an information resource by IDNS, utilities, private individuals and other government agencies. Therefore, IDNS requests that several issues in NUREG-1150 be revised before it is issued in final form.

(1) EXPERT OPINION METHODOLOGY

Uncertainties play an important role in all PRAs due to limited operating experience and plant-specific design differences. The result is the extensive use of expert opinion. NUREG-1150 formalizes the process for eliciting expert opinion and for propagating the resultant uncertainties through a PRA. IDNS believes that the process for eliciting expert opinion in the second draft of NUREG-1150 is a considerable improvement over the process in the first draft. This process is also a considerable improvement over the use of a single expert in PRA models. IDNS recommends that NRC discourage the use of informal methods for eliciting expert opinion in future PRAs and in IPEs required by Generic Letter No. 88-20.

However, the process for eliciting expert opinion in the second draft of NUREG-1150 has shortcomings. Some of the expert panels were too small, consisting of only two or three experts, to represent divergent opinions adequately. In addition, the process was too narrowly focused, neglected human reliability analysis (HRA) and external events, and analyses were performed on only a few internal events. IDNS believes that the potential for wide-spread use of NUREG-1150 requires that expert opinions also be obtained on external events and HRAs. Further, the process used

to identify uncertainty issues should be fully described. IDNS recommends that consideration be given to the use of bounding or sensitivity calculations as a basis for this process. IDNS further recommends that an elicitation experiment be performed using two or more separate panels for one or more issues. Such an experiment would illustrate the "uncertainty in the uncertainty," providing some assurance that the uncertainty is not panel-specific.

(2) EXTERNAL EVENT ANALYSIS

IDNS believes that PRAs should include analyses of the potential for severe accidents to be caused by external initiating events such as fires, earthquakes, tornados and floods. External event analyses are particularly important since the potential impact on risk is specific to plant design and the site. NUREG-1150 presents the development and application of simplified external events analysis methods for two of the five reference plants. IDNS recommends that external events be included for all five reference plants in NUREG-1150 and for all IPEs. PRAs performed prior to NUREG-1150, as well as the results of NUREG-1150 analyses for Peach Bottom and Surry, support the need to consider external events in PRAs.

(3) NUREG-1150 AS IPE REFERENCE DOCUMENT

IDNS regards the detailed methods, models, and data found in NUREG-1150 as important for use in the IPE process. The review of NUREG-1150 was hampered by the unavailability of many underlying contractor reports. IDNS is concerned that the unavailability of supporting documents will limit NUREG-1150's usefulness in the early, crucial stages of the IPE process. Therefore, IDNS recommends that all contractor reports supporting NUREG-1150 be completed and published in the near future.

(4) DEPENDENT/SUBTLE FAILURE ANALYSES

IDNS commends NRC for the use of an improved dependent failure analysis and the use of a systematic search strategy for "subtle failure mechanisms" identified in previous PRAs and in operating experiences. IDNS recommends maintaining and updating lists of these "subtle failure mechanisms." This is particularly important as the results of IPE studies begin to be submitted for NRC review, as operating experience accumulates, and as other probabilistic and deterministic studies are completed.

(5) NUREG-1150 AS REFERENCE DOCUMENT

Given the improvement in data, methods, and models used in the second draft of NUREG-1150, IDNS believes that NUREG-1150 should promptly replace the "Reactor Safety Study" (WASH-1400) as a general reference document. However, IDNS believes that the plant-specific and site-specific nature of the results in NUREG-1150 must be kept firmly in mind

when applying NUREG-1150's results, data, and methodologies. The continuing growth of operating experience, new analytical techniques, and experiments require that NUREG-1150 be updated often. NRC should make a specific commitment to perform this upgrade after the plant-specific IPEs are complete.

Thank you for the opportunity to comment on the Second Draft of NUREG-1150. If you have any questions about these comments or would like IDNS's assistance on any matter, do not hesitate to call me.

Sincerely,

Roy R. Wight

Roy R. Wight, Manager
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