December 27, 2000

Mr. David Lochbaum
Nuclear Safety Engineer
Union of Concerned Scientists
1707 H Street, NW, Suite 600
Washington, D.C. 20006-3919

Dear Mr. Lochbaum:

I am responding to your letter dated October 26, 2000, in which you identified a number of concerns regarding the Nuclear Regulatory Commission's (NRC) use of individual plant examination (IPE) results. Your concerns centered around (1) the use of IPE results in regulatory activities, (2) the role of IPE results in the agency's Accident Sequence Precursor (ASP) Program, and (3) the relationship between recent reports issued by the NRC's Office of Nuclear Regulatory Research (RES) and the IPE results.

The enclosed response is provided to show that, in the licensing decisions made by the NRC's Office of Nuclear Reactor Regulation (NRR) and in the ASP Program's screening, review, and analyses conducted by RES, when IPE results are employed, their use is tempered in accord with full understanding of their limitations. Hence, the staff believes, and I concur, that no additional policy guidance is required in this matter.

For a complete and detailed discussion of the NRC's current practices and future plans addressing the quality of PRA for use to support risk-informed regulatory activities, I refer you to the July 28, 2000, Commission Paper (SECY-00-162) that can be found on the NRC's Web site at the Commission Activities link. In addition, documents containing other general and specific guidance that the staff follows in its conduct of risk-informed licensing reviews are also available in the public domain (as referenced in the enclosure).

I appreciate the opportunity to provide the clarifications needed to address your concerns. I agree that it is important that we clearly communicate to our stakeholders the role that IPE results actually play in our licensing activities. Thus, I would appreciate any specific suggestions you may have about how we can improve our communication in this important area.

Sincerely,

/RA/

Richard A. Meserve

Enclosure: As stated

ENCLOSURE

AREAS OF CONCERN IDENTIFIED IN DAVID LOCHBAUM'S OCTOBER 26, 2000 LETTER TO THE NUCLEAR REGULATORY COMMISSION

This response has been structured to address the three areas of concern identified in your letter dated October 26, 2000.

The NRC's Use of Individual Plant Examination (IPE) Results in Regulatory Activities

The 1995 Commission Policy Statement on the Uses of PRA provides general guidance on the use of risk information in any regulatory activity. The policy statement states that the NRC should use PRA in regulatory activities only to the extent supported by the "state of the art." The policy statement also specifies the following conditions for use of PRA: (1) it must complement the deterministic approach, (2) it must support the defense-in-depth philosophy, and (3) it should be as realistic as practicable.

Regulatory Guide (RG) 1.174[1] provides specific guidance regarding the use of PRA in risk-informed decision-making regarding licensing actions. This guidance is also incorporated in Standard Review Plan (SRP) Chapter 19. More definition is provided in four application-specific RGs [1.175 (In-Service Testing), 1.176 (Graded Quality Assurance), 1.177 (Technical Specifications), and 1.178 (In-Service Inspection)] and associated SRP Sections 3.9.7, 3.9.8, and 16.1. These RGs address the quality of any risk information (including IPEs) that the staff may use to support its regulatory decision. The RGs include all the conditions laid out in the policy statement, and also incorporate the guidelines from the August 1986 Safety Goal Policy statement. RG 1.174 further refines the Commission's guidance by adding three additional specific conditions: (1) sufficient safety margins should be maintained, (2) proposed increases in risk should be small and consistent with the Commission's Safety Goal statement, and (3) performance measuring strategies should be used to monitor the change(s) that is (are) added.

Regulatory Guide 1.174 describes the integrated risk-informed process that the licensee and staff should use to evaluate proposed licensing actions (license amendments, relief requests, exemptions, waivers, Technical Specification changes, etc.). This process includes engineering analyses, assessments of defense in depth and safety margins, and risk evaluations. With respect to the risk assessment element of these reviews, RG 1.174 provides guidance on attributes of scope, level of detail, and PRA quality necessary to support risk-informed license requests. This RG states that both the deterministic and the probabilistic analyses performed in support of any application reflect the plant as it was built and as it is operated and maintained. Therefore, the risk evaluation submitted by a licensee in support of the proposed licensing

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[1]Single copies of regulatory guides, both active and draft, and draft NUREG documents may be obtained free of charge by writing the Reproduction and Distribution Services Section, OCIO, USNRC, Washington, DC 20555-0001, or by fax to (301)415-2289, or by email to <DISTRIBUTION@NRC.GOV>. Active guides may also be purchased from the National Technical Information Service on a standing order basis. Details on this service may be obtained by writing NTIS, 5285 Port Royal Road, Springfield, VA 22161; telephone (703)487-4650; online <http://www.ntis.gov/ordernow>. Copies of certain guides and many other NRC documents are available electronically on the internet at NRC's home page at <WWW.NRC.GOV> in the Reference Library. Documents are also available through the Electronic Reading Room (NRC's ADAMS document system, or PARS) at the same web site.

action will be based on the licensee's risk model of the plant as updated to reflect any changes in the plant's design/configuration since completion of the IPE. Alternatively, the licensee's risk evaluation may demonstrate that any design/configuration changes that have not been modeled have no impact on the risk assessment supporting the requested change.

During their review of a licensee's proposed licensing action, staff members issue requests for additional information (RAIs) at a level of detail they believe is required to determine whether the supporting risk analysis performed is of sufficient quality to support the final licensing decision. Members of the staff have visited a number of plants during the review of licensing actions to audit the on-site documentation for the PRA and application-specific analyses conducted by the licensee. In the course of their review, the staff may refer to the licensee's IPE submittal and the NRC review thereof to determine whether they contain any risk insights relevant to the specific application. Nonetheless, the staff ensures that appropriately updated PRA models form the basis of the licensee's submittal. The safety evaluations for risk-informed licensing actions explicitly discuss the staff's evaluation of the quality of the risk assessment used to support the licensing action request and the basis for the finding that the quality was sufficient for the decision.

As the NRC moves into new areas of risk-informed regulation, ensuring the quality of the risk information used in regulatory decisions becomes a central issue. SECY-00-162, "Addressing PRA Quality in Risk-Informed Activities,"[2] provides a general discussion of this issue. Attachment 2 of SECY-00-162 contains a specific discussion of the role of risk insights in regulatory decisionmaking and how they are integrated with defense-in-depth and safety margins considerations. This attachment also describes how the implementation of the decision is influenced by the degree of confidence that the staff has in the results of the risk analysis used to support the decision.

In a related matter, the NRC staff, industry, and professional groups (e.g., ASME and ANS) are participating in a joint effort to develop national consensus PRA standards. In addition, the reactor owners' groups have been developing and applying a PRA peer review program for several years. In April 2000, the Nuclear Energy Institute (NEI) submitted NEI-00-02, "Probabilistic Risk Assessment Peer Review Process Guidance, Revision A3," to the NRC for review in light of the increasing number of risk-informed licensing actions.

In summary, the NRC's position regarding the quality of risk information used in regulatory decisionmaking has been clearly stated in documents available in the public domain.

The Role of IPE Results in the ASP Program

The three phases of the Accident Sequence Precursor (ASP) Program and the extent to which IPE results are used in each are discussed below. The ASP Program's screening, review, and analysis of operational experience are described in detail in the report, "Precursors to Potential

[2]Electronic copies are available in NRC's Public Electronic Reading Room, which can be accessed through the NRC's web site, <WWW.NRC.GOV> .

Severe Core Damage Accidents: 1998," NUREG/CR-4674, Volume 27, published in July 2000.[3] The screening process employed by the ASP Program identifies LERs that meet minimum selection criteria for precursors. These criteria were developed using years of precursor data and did not use IPE results. An event that is screened is then subjected to an engineering review to determine if it is a candidate for detailed analysis. This initial review is a conservative review, designed to capture events that in some way appear to deserve detailed review and to eliminate events that are clearly unimportant. The process involves eliminating events that satisfy predefined criteria for rejection. The selection criteria were developed in 1988 using the cumulative experience obtained from years of review and analysis of operational events for potential precursors and also did not use IPE results. The analysis phase of the program uses IPEs to the extent described as follows.

The standardized plant analysis risk (SPAR) models used to perform the calculations in the ASP Program represent the latest products of an evolutionary process that began in 1979 with the original two sets of standardized event-tree-based models used to represent the response of the two basic types of nuclear plants [boiling water reactors (BWRs) and pressurized water reactors (PWRs)] to a set of initiating events. Refinement and improvement of these models over the years to satisfy the needs of staff analysts led to the plant-specific SPAR models that are used in current precursor analyses. The SPAR models incorporate standardized modeling assumptions regarding technical issues that have been treated differently from one plant's IPE to another. Examples of these include human reliability analysis, reactor coolant pump seal failure, and recovery from a loss of offsite power initiator. One goal of the SPAR model development effort is to produce a standard set of models that can be used to perform consistent regulatory analyses. In this respect, where areas of uncertainty were involved, a conscious effort has been made to employ an approach that is conservative. In the development of the SPAR models, the IPEs have been used only as a check on the structure of the logic models, the system success criteria, the equipment unavailabilities, the human error probabilities used in the human reliability analysis, and the modeling of recovery. If significant differences between the SPAR model and the IPE were identified, other relevant sources of plant information were consulted (e.g., UFSAR, emergency operating procedures, NRC regional inspectors, plant resident inspectors, technical experts on NRC headquarters staff, licensee staff) to understand the reasons for the differences. For example, when reviewing the IPEs for some PWRs, the staff observed that the success criteria for the number of charging pumps needed to mitigate the effects of certain initiating events (e.g., small break loss-of-coolant accident, transients) differed from plant to plant. Determination of the appropriate success criteria to be used in the SPAR models for these plants and the bases for these criteria was pursued during discussions with licensee staffs and with the resident inspectors at the specific plants in question. The latest version of the SPAR models is being subjected to systematic internal and external quality reviews. The external quality review consists of a focused, detailed review at the plant site involving the NRC staff, the NRC's contractor staff, and the licensee's PRA staff, if available. In this review, the SPAR model for the plant is reviewed against up-to-date information regarding the plant's system [e.g., plant drawings, such

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[3]Copies are available at current rates from the U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20402-9328 (telephone (202)512-1800); or from the National Technical Information Service by writing NTIS at 5285 Port Royal Road, Springfield, VA 22161; (telephone (703)487-4650; <http://www.ntis.gov/ordernow>. Copies are available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike, Rockville, MD; the PDR's mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or (800)397-4209; fax (301)415-3548; email is PDR@NRC.GOV.

as piping and instrumentation diagrams (P&IDs), system descriptions] and operations (including the emergency operating procedures), and where available, the licensee's updated PRA model for the plant. Comments generated by the review are resolved to the staff's satisfaction and any appropriate model changes are made before the model is certified for general use by NRC staff analysts.

When the NRC staff performs a precursor analysis in the ASP Program, it uses IPEs as one of a number of sources of information about the design and operational practices of a plant. As mentioned above, the ASP Program has its own standardized modeling assumptions. Any IPE information that is considered in an ASP analysis is first compared with these "standards" and adjustments are made, where appropriate, as follows. When used by the staff analyst, a plant's IPE may be reviewed for insights about plant-specific values for equipment unavailabilities, human error probabilities, and specific sequence recovery measures (e.g., the amount of time available for operators to perform a specific mitigating action). Any data from the IPEs used as input to a precursor analysis are checked against other sources of information (e.g., NRC regional inspector, plant resident inspector, regional office Senior Reactor Analyst, UFSAR, licensee staff) to determine their validity. In order to provide assurance that ASP analyses accurately model a specific plant's response and use appropriate assumptions, each preliminary ASP analysis is sent to the licensee and to the NRC staff (including the cognizant regional office) for review. The licensee is asked to review and comment on the technical adequacy of the analysis, including a depiction of its plant equipment and equipment capabilities. Each of the review comments received from the licensee and the NRC staff is evaluated for reasonableness and pertinence to the ASP analysis in an attempt to use realistic values, and the conditional core damage probability calculations are revised where appropriate. The objective of this review process is to provide as realistic an analysis of the risk significance of the event as possible.

Relationship between Recent RES Reports and IPE Results

Your letter cited a number of technical reports recently issued by RES regarding the regulatory effectiveness of the Anticipated Transient Without Scram (ATWS) Rule and the reliability of certain safety systems. RES is reviewing regulations to determine whether the requirements are achieving the desired outcomes. This specific initiative is part of an evolving program to make NRC activities and decisions more effective, efficient, and realistic. The goal of the evaluation of the ATWS Rule documented in the draft report, "Regulatory Effectiveness of the Anticipated Transient without Scram Rule," was to determine whether the ATWS Rule and the recommendations issued with it were effective. The effectiveness of the ATWS Rule was determined by comparing regulatory expectations to outcomes. The assessment concluded that the ATWS Rule has been effective in reducing ATWS risk and that the cost of implementing the rule was reasonable. Rather than challenging the validity of IPE results, the draft report observed, as had been documented previously in NUREG-1260, that there was plant-to-plant variability in the values licensees used in their IPEs for the human error probabilities that were used to estimate the ATWS contribution to the overall core damage frequency (CDF). The issue is not to identify conservatisms or non-conservatisms in what are now 10-year old IPEs, but rather to identify risk insights, assess the overall effectiveness of the rule, and identify improvements, if warranted. Studies such as the draft ATWS report provide insights into the quality of the IPEs and PRAs used by licensees to support requests for licensing actions. This information is fed back to the regulatory process for consideration in the

risk-informed reviews and subsequent decisions regarding such requests according to the guidance discussed in the previous response.

The objectives of the system reliability studies being performed by RES are to (1) estimate the system unreliability based on operating experience and to compare these estimates with the estimates using data from PRAs and IPEs, and (2) review the operating data from an engineering perspective to determine trends and patterns seen in the data and provide insights into the failures and failure mechanisms associated with the operation of the system. These studies form part of an ongoing program of risk-based analysis of reactor operating experience. The effort was undertaken to systematically identify risk-significant insights and provide feedback to the regulatory process. These studies are also being used in the development of risk-based performance indicators that will be based to a large extent on plant-specific system and equipment performance. In the RES reports documenting the system reliability studies cited in your letter, the values of system reliability obtained from the analysis of operating experience data for some plants were lower than the corresponding values provided in the IPEs. As explained above, such differences were examined from an engineering perspective to identify potential contributing factors, and this information was then fed back to be considered in evaluations related to risk-informed licensing decisions.