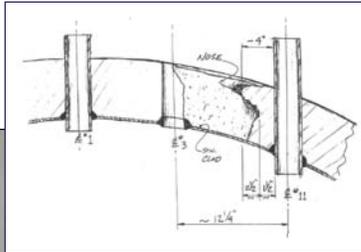


# “How Things Fail” – New Seminar Series

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## ***Abstract***

In 2010, RES/DRA will host a series of informal seminars on the general subject of how systems, structures, and components of interest to NRC might fail. The seminars, which will feature invited talks emphasizing field observations from a wide variety of perspectives (including man-machine systems, piping and pressure vessels, digital instrumentation and control, active mechanical systems), will be aimed at junior staff interested in developing, reviewing, or using PRA models.

## ***Recently Held/In Preparation***

- Crew responses in emergency situations (H. Broberg, OECD/HRP)
- Digital instrumentation and control (D. Santos, RES/DE)
- Passive components: piping and pressure vessels (R. Tregoning, RES/DE)

## ***Background***

Risk, as used in the NRC, is the answer to three questions: “What can go wrong?” “What are the consequences?” and “How likely is this?” For the purposes of probabilistic risk assessment (PRA), the first question can be crucial because what isn’t in a PRA model won’t be quantified. It can also be the most challenging, because the rarity of actual failure events limits the empirical data that can be used to check a PRA model’s completeness.

For operating nuclear power plants (NPPs), arguably, the completeness issue is addressed through the combined experience of the NPP PRA community over the years. This experience includes information gained from PRA updates and reviews (as the PRAs are used in different risk-informed applications), and information gained from inspection findings and operational events in the U.S. and abroad. However, much of this experience may not be relevant for new NPP designs. Even for operating plants, situations can arise for which past experience may not be relevant. (Consider, for example, digital upgrades of existing I&C systems.)

In situations where community experience is lacking, we rely on the PRA analysis team (and reviewers) to search for credible ways that the system can fail. This requires more than creativity, an ability and willingness to “think outside the box” in generating possibilities. The requirement for credibility is a requirement for technical knowledge. With knowledge of important relevant mechanisms (psychological and social as well as physical) and failure events (for analogous systems and situations), the analysts/reviewers will have a basis for: (a) judging whether a possible scenario is likely enough to warrant consideration, and (b) communicating with others.

The seminars in this series will communicate lessons learned by NRC and other organizations, building upon empirical, field experience as well as theoretical considerations.