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RELCON SCANDPOWER
Risk Management

R-Book – Supplementary description for submission of proposal to NKS

Table of Contents

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1. Objective and Background

The objective of the project is see if it is possible to utilize the OECD Nuclear Energy Agency "OECD Pipe Failure Data Exchange Project" (OPDE) database to derive piping component failure rates and rupture probabilities for input to internal flooding probabilistic safety assessment, high-energy line break" (HELB) analysis, risk-informed in-service inspection (RI-ISI) program development, and other activities related to PSA. If no major obstacles are found then the OPDE database will be used in order to produce a piping reliability parameter data handbook called the "R-Book". This R&D project is funded by member organizations of the Nordic PSA Group (NPSAG) – Forsmark AB, OKG AB, Ringhals AB, and the Swedish Radiation Safety Authority (SSM) (formerly SKI).

The history behind the current effort to produce a handbook of piping reliability parameters goes back to 1994 when SKI funded a 5-year R&D project to explore the viability of establishing an international database on the service experience with piping system components in commercial nuclear power plants. An underlying objective behind this 5-year program was to investigate the different options and possibilities for deriving pipe failure rates and rupture probabilities directly from service experience data as an alternative to probabilistic fracture mechanics. The R&D project culminated in an international piping reliability seminar held in the fall of 1997 in Sigtuna (Sweden) [2] and a pilot project to demonstrate an application of the pipe failure database to the estimation of loss-of-coolant-accident (LOCA) frequency (SKI Report 98:30 [1]).

A particularly important outcome of the 5-year project was a decision by SKI to transfer the pipe failure database including the lessons learned to an international cooperative effort under the auspices of the OECD Nuclear Energy Agency. Following on information exchange and planning meetings that were organized by the OECD Nuclear Energy Agency during 2000 – 2001, the "OECD Pipe Failure Data Exchange Project" (OPDE) was officially launched in May 2002. Today (January 2008), the OPDE is supported by organizations from twelve countries. The project's third term (2008-2011) was approved in November 2007. General information about OPDE can be found at www.nea.fr.

Since the completion of the original piping reliability R&D project in 1998, a very large number of practical pipe failure database applications have been completed, some of which are referenced in [3]. The insights and lessons learned from these practical applications, including the experience gained from the OPDE project, form the basis for developing the "R-Book." An important observation from prior applications is the need to ensure that reports on pipe degradation and failure as recorded in a database are fully validated and that the event populations that result from database queries are sufficiently complete.

2. Project organization

The work is performed by Relcon Scandpower in co-operation with Scandpower Risk Management in Houston, Texas. Main project participants are:

Anders Olsson, project leader	Relcon Scandpower
Vidar Hedtjärn Swaling (*junior*)	Relcon Scandpower
Bengt Lydell	Scandpower Risk Management

The project is as mentioned above funded by the Nordic PSA Group (NPSAG) with participation from SSM and the utilities RAB, FKA and OKG. Each of these has an assigned project coordinator and they are:

Cilla Persson (*junior*)	RAB
Göran Hultqvist	FKA
Ida Lindberg (*junior*)	OKG
Tomas Jelinek	SSM

3. Participation of young scientist

As can be seen from above the project involves several “junior scientist”. The majority of the workload is performed by Relcon Scandpower and Scandpower Risk Management stands for guidance and quality assurance. Bengt Lydell is the senior expert within the field and Vidar Hedtjärn Swaling is performing much of the work. A very important part of the project is knowledge transfer from Mr. Lydell to Mr. Swaling.

4. Activity plan

The project activity plan is given in Appendix 1 and the work is expected to be finalized with a first version of the R-Book at the end of 2009. After this some continued work is expected with respect to maintain the handbook and keep it updated a regularly manner.

5. References

[1] Bengt Lydell, “Failure Rates in Barsebäck-1Reactor Coolant Pressure Boundary Piping, An Application of a Piping Failure Database”, SKI Report 98:30 (May 1999)Ccc

[2] Ralph Nyman (Editor), Seminar on Piping Reliability, SKI Report 97:32 (October 1997).

[3] Anders Olsson and Bengt Lydell. “Reliability Data for Piping Components in Nordic Nuclear Power Plants “R-Book” Project Phase I”, SKI Report 2008:01 (January 2008).

Light Water Reactor Plant Systems				
Index	**OPDE Generic** (1)	**Description**	**Swedish Designations**	**Delivery**
1	ADS	BWR Primary	314	Mar-09
2	AFW	Auxiliary Feedwater System	327	Mar-09
3	CC	Component Cooling Water	711/712	Mar-09
4	COND	Condensate System	414/430 (2)	
5	CRD	Control Rod Drive	354	Mar-09
6	CS	Containment Spray System	322	Mar-09
7	CVC	Chemical & Volume Control	334	Mar-09
8	CW	Circulating Water System	443	June-09
9	EXT	Steam Extraction System	419/423	June-09
10	FPS	Fire Protection System	762	June-09
11	FW	Main Feedwater System	312/415 (3)	June-09
12	HPCS	High Pressure Core Spray	--	June-09
13	HPSI	High Pressure Safety	--	Sep-09
14	LPCS	Low Pressure Core Spray	323	Sep-09
15	LPSI	Low Pressure Safety Injection	321 (LPSI)	Sep-09
16	MS	Main Steam System	311/411 (4)	Sep-09
17	MSR	Moisture Separator Reheater	422	Sep-09
18	RCS	Reactor Coolant System	313	Dec-08
19	RHR	Residual Heat Removal	321	Sep-08
20	RR	Reactor Recirculation System	313	Dec-08
21	RPV-HC	RPV Head Cooling System	326	Dec-09
22	RVLIS	Reactor Vessel Level	536	Dec-09
23	RWCU	Reactor Water Cleanup	331	Dec-09
24	SFC	Spent Fuel Pool Cooling	324	Dec-09
25	S/G Blowdown	Steam Generator Blowdown	337	Dec-09
26	SLC	Standby Liquid Control	351	Dec-09
27	SW	Service Water System	712/715	Dec-09

Notes:

1. See IEEE Std 805-1984 (IEEE Recommended Practice for System Identification in Nuclear Power Plants and Related Facilities) for information on system boundary definitions and system descriptions.
2. 414 for F1/F2/R1/R2/R3/R4 and 430 for O1/O2/O3
3. 312 for O1/O2/O3 and 415 for F1/F2/R1/R2/R3/R4. Also note that 312 is the designation for steam generators in Ringhals-2/3/4
4. 311 for O1/O2/O3 411 for F1/F2/R1/R2/R3/R4

Required Submission Criteria. Order of Submission. The order of your new submission should be as follows: 1) Cover Letter. 2) Conflict of Interest Forms (one per author). 3) Manuscript File (should include title page, abstract, full manuscript body text, conflict of interest statementÂ format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. Instructions for submission of proprietary or privileged information are provided in Chapter I, Section D.3. e. Proposal Certifications.Â With the exception of "Special Information and Supplementary Documentation" and "Appendices," all sections are required parts of the proposal. These documents must be submitted electronically via the Proposal Preparation Module in the FastLane system. 17.Â Proposals with "Grant Proposal Guide" selected to Division and Program combinations with active program descriptions will default to the nearest target date. Proposers are advised to select "No Closing Date" when the proposal is not submitted in response to any relevant NSF funding opportunity (which includes program announcements, solicitations or program descriptions.) The Client shall allow shortlisted consultants sufficient time (depending on the type of proposal required, e.g., full technical proposal, simplified technical proposal, or biodata technical proposal) to study the bidding document, prepare complete and responsive proposals, and submit their proposals. Proposal Preparation and Submission. The shortlisted consultant is solely responsible for the preparation and submission of its proposal. During this stage, the Client shall. â€¢ promptly respond to requests for clarifications from shortlisted consultants and amend the RFP as needed, and. Manuscripts submitted for initial consideration must adhere to these standards: Submissions must be complete with clearly identified standard sections used to report original research, free of annotations or highlights, and include all numbered and labeled components. Figures, charts, tables, schemes, and equations should be embedded in the text at the point of relevance. Separate graphics can be supplied later at revision, if necessary.Â Addition or deletion of an author or authors after submission of the manuscript requires justification from the corresponding author and is subject to approval by the Editor. Institution Address. The author affiliation(s) listed should be the institution(s) where the work was conducted.