

HLWYM HEmails

From: Budhi Sagar
Sent: Monday, July 10, 2006 6:42 PM
To: Amitava Ghosh; Biswajit Dasgupta; George Adams; Lee Abramson; Dennis Damon; Robert Johnson (NMSS); Mahendra Shah; Christopher Ryder; Rosemary Reeves; Michael Waters
Subject: RE: Technical Discussion on the Example for Crane Reliability

Rosemary,

I do have another meeting at 8:30 (9:30 EDT) tomorrow morning. Can you give me the bridge number to call so that I can be in the meeting for the initial 1/2 hour?

I do have time tomorrow afternoon to attend; if the meeting needs to continue.

It is a good idea to have a probability/statistics expert involved in the discussion.

I would prefer to not spend too much time discussing whether 3/54,000 is a probability or a frequency. In theory, when the denominator of this ratio (54,000) tends to infinity then, the rate (or frequency) becomes the probability. Because the denominator is not infinite, that is why there is uncertainty in this estimate and Chris works out a 95% confidence bound. My main questions are (i) we need to estimate an annual frequency so that using the Poisson model, we can estimate the probability of one or more failures during the operational period -- this will depend upon the number of lifts per year, note that all calculation in the PCSA proceed on a per unit time basis; (ii) the confidence bound on the mean should be a function of both the failures (3) and number of lifts (54,000) or of the standard deviation which for a Poisson is the square root of mean rate x time. I suspect that in this case, the confidence bounds will be very narrow, that is we will have high confidence in the mean because of large number (54,000) of "experiments"; (iii) we also need to look from a policy perspective whether we should extend our analyses to the level of determining confidence bounds on statistics such as mean and variance.

I am discussing separately with George, the HVAC example which I believe for realism should include the possibility of repair of the first member of the train before the second member also fails. The main idea of having redundant parts in a system is to decrease the probability that both members of the HVAC train will be in a failed state (not available for service) at the same time. Therefore, in this case, we should calculate the probability that the first train will fail during its service period (say 6 months) and that the second train will fail in a short period (say a week or two weeks) before the first is repaired. So, the overall probability of the HVAC system being not available in a year, in this case will be: $\text{prob}\{\text{first member fails in time } T1\} \times \text{prob}\{\text{second member fails in time } T2\} \times \text{prob}\{\text{first member is not repaired in time } T2\}$. Given the data in the current example, I find this probability to be quite small.

Budhi

-----Original Message-----

From: Rosemary Reeves [mailto:RBR@nrc.gov]
Sent: Monday, July 10, 2006 4:50 PM
To: aghosh@cnwra.swri.edu; bdasgupta@cnwra.swri.edu; bsagar@cnwra.swri.edu; gadams@cnwra.swri.edu; Christopher Ryder; Dennis Damon; Lee Abramson; Michael Waters; Mahendra Shah; Rosemary Reeves; Robert Johnson
Subject: Technical Discussion on the Example for Crane Reliability

Item Type: Appointment
Start Date: Monday, 10 Jul 2006, 09:00:00am (Eastern Daylight Time)
Duration: 1 Hour

Place: T-10C2

Hello Folks,

With Robert's help, (Thanks!) I set up a meeting for Tuesday morning to start the technical discussions mentioned in today's meeting. This was the best we can do, with such short notice, but it looked like most of the folks were available then. In addition, Robert has indicated that he will try to shorten the Preclosure Team Mtg. at 2 pm tomorrow, (down to 30-45 min) so that the technical discussions could resume after the regular meeting.

Please email your list of technical issues to me so that I can distribute to the team and we can begin to work through them.

I wrote down a few that seemed to need some clarification/discussion:

frequency vs. probability

mean vs. confidence interval

uncertainty - need to quantify or not?

Thanks,
Rosemary

PS - Dennis - we are in need of your technical expertise in the area of statistics and probability. Chris Ryder can fill you in on the background for this task. We are working on examples of estimating reliability to be attached to an ISG on the Preclosure Safety Analysis (PCSA). If at all possible, please come to the 9 am meeting.

Hearing Identifier: HLW_YuccaMountain_Hold_EX
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Mail Envelope Properties (bsagar@cnwra.swri.edu20060710184139)

Subject: RE: Technical Discussion on the Example for Crane Reliability
Sent Date: 7/10/2006 6:41:39 PM
Received Date: 7/10/2006 6:41:39 PM
From: Budhi Sagar

Created By: bsagar@cnwra.swri.edu

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Files	Size	Date & Time
MESSAGE	4193	7/10/2006 6:41:39 PM

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