RAS 5675 72-22-ISFSI-State Exhibit 205-Recd 6/5/02

From arabasz@seis.utah.edu Mon Jun 3 17:04:03 2002
Return-Path: <arabasz@seis.utah.edu>
From: "Walter J. Arabasz" <arabasz@seis.utah.edu>
Date: Mon, 3 Jun 2002 17:04:03 -0600 (MDT)
To: Ivan_Wong@URSCorp.com
Subject: clarification re YM
Cc: arabasz@seis.utah.edu
X-Sun-Charset: US-ASCII

DOCKETED
USNRC

2003 JAN 31 PM 2:19

OFFICE OF THE SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Ivan: You wrote...

> Walter, a DSHA done by the USGS using the experts seismic source
> characterization and attenuation relationships results in the following
> values for a M 6.7 on the Solitario Canyon-Fatigue Wash- Windy Wash fault
> system for the reference rock outcrop:
>
> 1 Hz 0.39 g median and 0.90 g 84th percentile
> 10 Hz 1.13 g median and 2.24 g 84th percentile
>
> If you go to the hazard curves in the final report, the 84th percentile
> values have a return period of about 5300 years or an annual exceedance
> probability of about 2 x 10-4.

Referring to Figures 7-5 and 7-6 in the YM final report,
I get about 2 x 10-5 rather than 2 x 10-4.
Am I correct?

Walt

From Ivan_Wong@URSCorp.com Mon Jun 3 17:35:49 2002
Return-Path: <Ivan_Wong@URSCorp.com>
From: Ivan_Wong@URSCorp.com
Subject: Re: clarification re YM
To: "Walter J. Arabasz" <arabasz@seis.utah.edu>
X-Mailer: Lotus Notes Release 5.0.2a November 23, 1999
Date: Mon, 3 Jun 2002 16:27:30 -0700
X-MIMETrack: Serialize by Router on SMTP102/URSCorp(Release 5.0.10 |March 22, 2002) at
06/03/2002 07:29:44 PM

Walter, thanks for checking my work. Yes, it is 2 x 10-5. Big difference.
Sorry for the error.

NUCLEAR REGULATORY COMMISSION
Docket No. _____ Official Exh. No. 205
In the matter of PFS
Staff _____ IDENTIFIED ✓
Applicant _____ RECEIVED _____
Intervenor ✓ REJECTED _____
Other _____ WITHDRAWN _____
DATE 060502 Witness Arabasz
Clerk SMS

Template = SECY-028

SECY-02
State Ex 205

Probabilistic Seismic Hazard Analyses for Ground Motions and Fault Displacement at Yucca Mountain, Nevada

J. Carl Stepp, M.EERI, Ivan Wong, M.EERI, John Whitney, Richard Quittmeyer, M.EERI, Norman Abrahamson, M.EERI, Gabriel Toro, M.EERI, Robert Youngs, M.EERI, Kevin Coppersmith, M.EERI, Jean Savy, M.EERI, Tim Sullivan, and Yucca Mountain PSHA Project Members

Probabilistic seismic hazard analyses were conducted to estimate both ground motion and fault displacement hazards at the potential geologic repository for spent nuclear fuel and high-level radioactive waste at Yucca Mountain, Nevada. The study is believed to be the largest and most comprehensive analyses ever conducted for ground-shaking hazard and is a first-of-a-kind assessment of probabilistic fault displacement hazard. The major emphasis of the study was on the quantification of epistemic uncertainty. Six teams of three experts performed seismic source and fault displacement evaluations, and seven individual experts provided ground motion evaluations State-of-the-practice expert elicitation processes involving structured workshops, consensus identification of parameters and issues to be evaluated, common sharing of data and information, and open exchanges about the basis for preliminary interpretations were implemented. Ground-shaking hazard was computed for a hypothetical rock outcrop at -300 m, the depth of the potential waste emplacement drifts, at the designated design annual exceedance probabilities of 10^{-3} and 10^{-4}. The fault displacement hazard was calculated at the design annual exceedance probabilities of 10^{-4} and 10^{-5}.

INTRODUCTION

The Nuclear Waste Policy Amendments Act of 1987, as amended, assigns to the U.S. Department of Energy (DOE) the responsibility for evaluating Yucca Mountain as a potential geologic repository for the nation's first permanent disposal facility for spent nuclear fuel and high-level radioactive waste. Yucca Mountain is located about 160 km northwest of Las Vegas, Nevada, in the Basin and Range Province. This portion of the Basin and Range Province is tectonically active in extension at a low strain rate, and characterized by late-Quaternary normal faulting, paleoseismic evidence for the occurrence of earthquakes up to about moment magnitude (M_w) 7.5, and a moderate level of historical seismicity.

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(IW) Seismic Hazards Group, URS Corporation, 500 12th Street, Suite 200, Oakland, CA 94607
(JW) U.S. Geological Survey, MS 425, P.O. Box 25046, Denver, CO 80225
(RQ) URS Corporation, 1180 Town Center Drive, Las Vegas, NV 89144
(NA) 152 Dracena Avenue, Piedmont, CA 94611
(GT) Risk Engineering, 3 Farmers Row, Acton, MA 01720
(RY, KC) Geomatrix Consultants, 2101 Webster St , 12th Floor, Oakland, CA 94612
(JS) Lawrence Livermore National Laboratory, 7000 East Avenue, Livermore, CA 94550
(TS) U.S Department of Energy, MS 523, P.O Box 98608, Las Vegas, NV

in Figures 9c and 9d. Consensus on the median values occurs when the experts' estimates of the median and standard deviation are within the epistemic uncertainty of the others. Significant differences occur when the experts' median estimates differ by more than their estimates of the epistemic uncertainty.

GROUND MOTION HAZARD CALCULATIONS AND RESULTS

Ground motion hazard was computed at the reference rock outcrop (Point A, Figure 2). The calculation was conducted in three steps. For each SSFD expert team, the calculation was performed for each seismic source for each combination of attenuation and seismic source parameters, resulting in an appropriately weighted aleatory hazard curve for each combination. The total hazard across sources was then aggregated for each team to obtain the teams' mean and fractile hazard curves. The integrated hazard across all SSFD teams was obtained by combining the expert teams' mean and fractile hazard curves giving each team equal weight. A minimum magnitude of M_w 5.0 was used as the lower bound for integrating the earthquake recurrence relationship in the hazard calculations (EPRI 1989, Appendix B). The aleatory uncertainty (the variability about the GM experts' median attenuation) in the ground motion attenuation equations was modeled using the unbounded lognormal distribution (no upper bound was assumed).

Ground motion hazard was calculated for the ground motion measures PGA, PGV, and spectral accelerations at 0.3, 0.5, 1, 2, 5, 10, and 20 Hz structural frequencies. The computations were based on equal weighting of the six SSFD expert teams' interpretations and the seven GM experts' interpretations. The results are presented in the form of summary hazard curves, which depict the mean, median, and 15th and 85th fractile of the calculated aleatory hazard curves. The mean and median convey the central tendency of the hazard results while the separation between the 15th and 85th fractile curves conveys the epistemic uncertainty on the calculated exceedance probability. Figure 10 shows summary hazard curves for PGA and 1 Hz spectral acceleration.

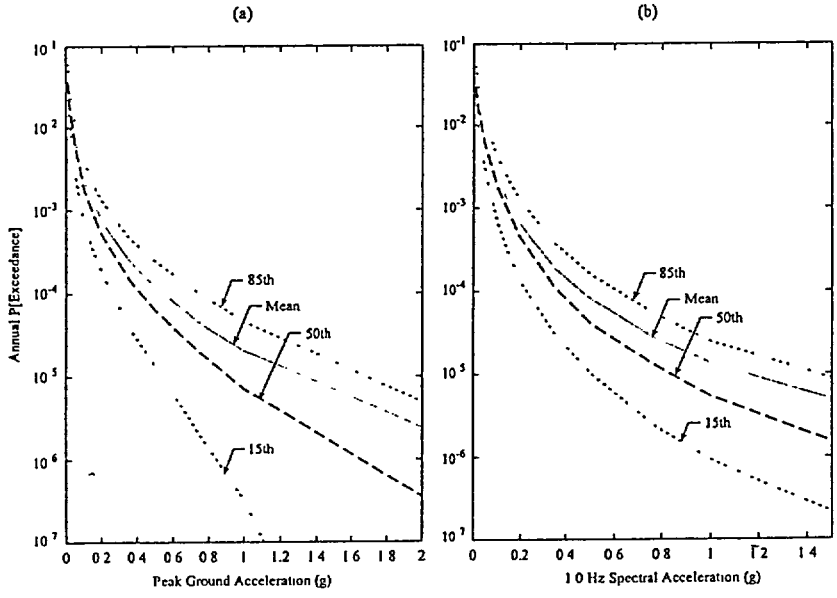
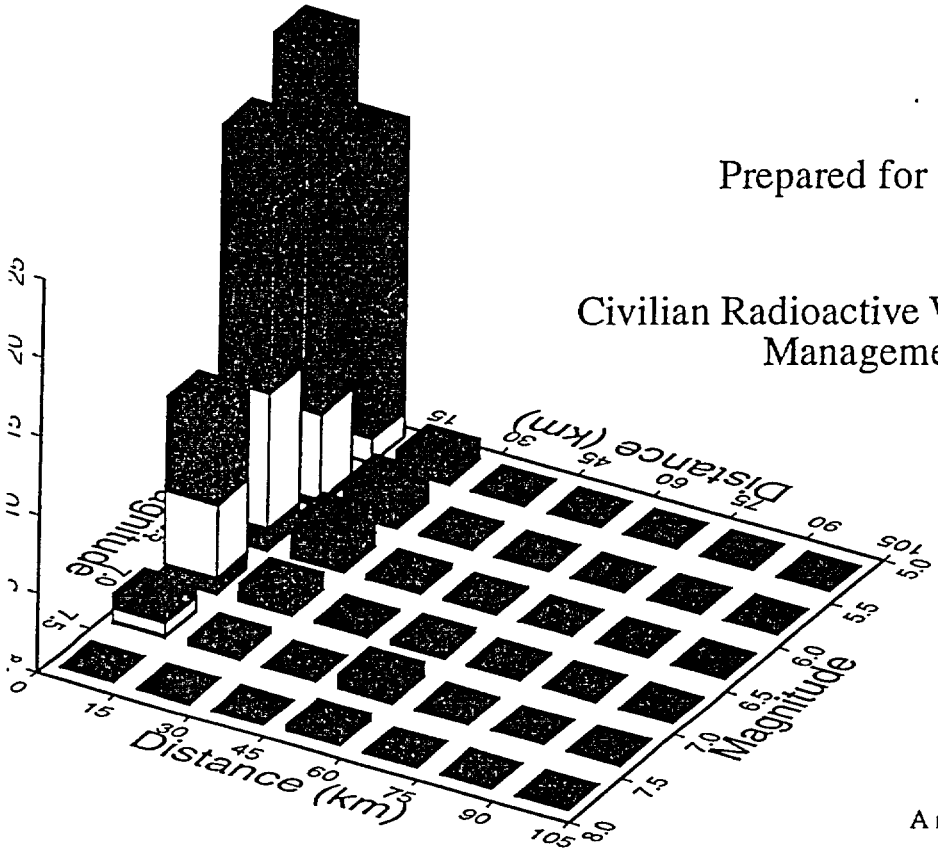


Figure 10. Summary hazard curves for horizontal (a) PGA and (b) 1 Hz spectral acceleration

PROBABILISTIC SEISMIC HAZARD ANALYSES FOR FAULT DISPLACEMENT AND VIBRATORY GROUND MOTION AT YUCCA MOUNTAIN, NEVADA

FINAL REPORT
VOLUME 1
TEXT



Prepared for the U.S. Geological Survey

by the

Civilian Radioactive Waste Management System
Management & Operating Contractor

Ivan G. Wong and J. Carl Stepp
Report Coordinators

A report to the U.S. Department of Energy
that fulfills Level 3 Milestone SP32IM3
WBS Number 1.2.3.2.8.3.6

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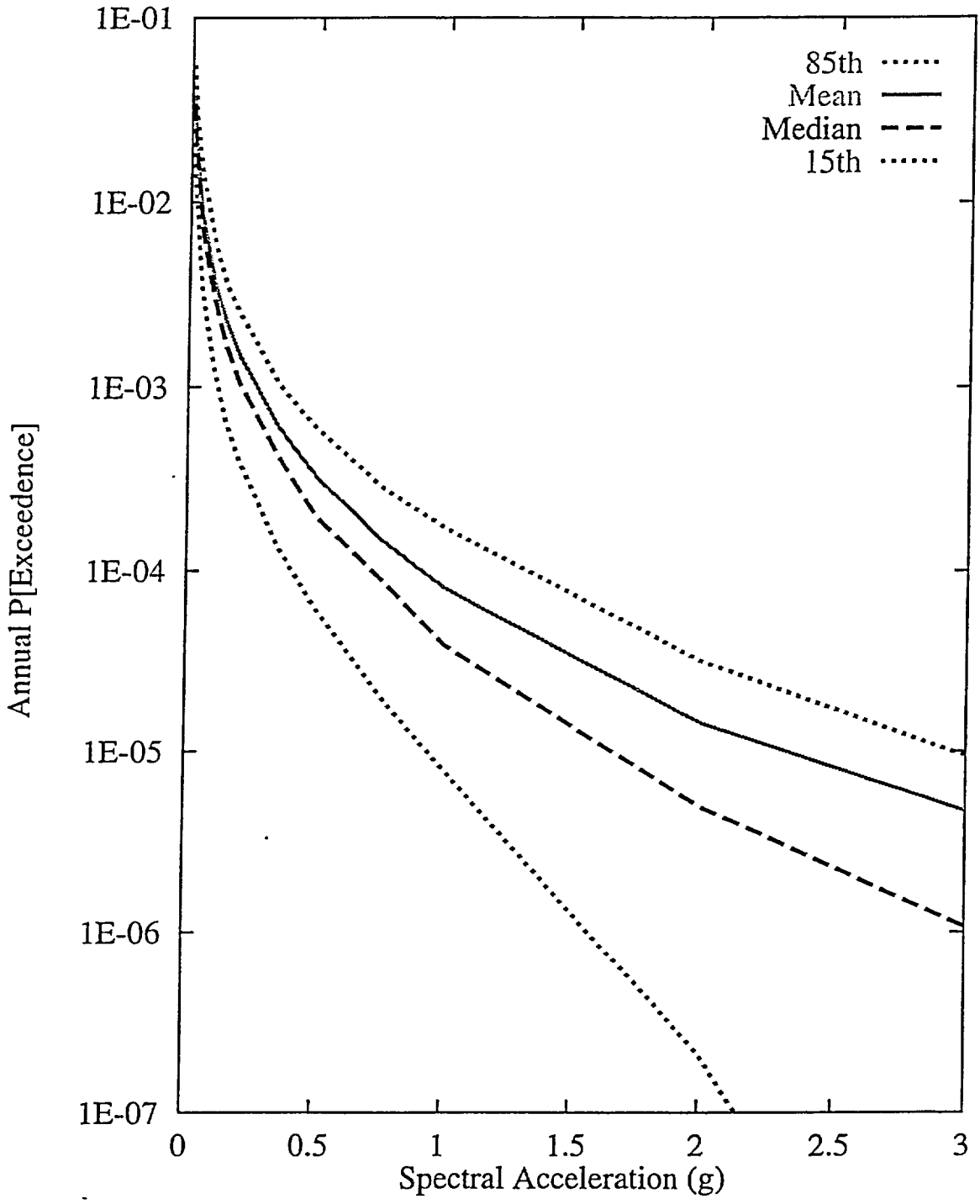

Figure 7-9 Integrated seismic hazard results: summary hazard curves for 10-Hz vertical spectral acceleration