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Feb. 19, 2004

Dr. Andrew J. Murphy
Engineering Research Applications Branch
Division of Engineering Technology
Mail Stop: T-10D20
U.S. Nuclear Regulatory Commission
Rockville, MD 20555-0001

Dear Dr. Murphy,

This is our monthly letter status report for January, 2004.

Project Title: Evaluation of 2002 USGS National Seismic Hazard Assessment

Job code: Y6797

P.I.: Arthur Frankel

Period of Performance: August 2003-March 2004

Reporting Period: Jan. 1-31, 2004

Expenses in Jan. 2004 charged to the NRC project:

Estimated Salaries: \$29,125.63

Travel of Cramer from Memphis to Golden to work on hazard programs: \$2,077.61

Estimated Assessments: \$14,318.48

Total for Jan 2004: \$45,521.72

Total spending to date: \$146,155.37 (including assessments)

Remaining funds: approx. \$51,844.63

This month's work involved extensive testing and modifying the set of computer codes we have written to do Monte Carlo simulations and produce fractile hazard curves and deaggregations. We have been comparing the mean hazard curves from the limited set of

A-1

hazard models used in the national seismic hazard maps with the mean curves from the Monte Carlo simulations. A set of mean hazard curves for hard-rock sites for all the frequencies of interest have now been calculated for the 29 sites, based on the national map procedure. We found that our initial Monte Carlo code produced a higher mean hazard curve than the national map procedure, largely caused by assigning a uniform distribution to the magnitude variability in the part of the code that generates new earthquake catalogs by re-sampling events in the actual catalog and by randomly perturbing their locations and magnitudes. We found that using a symmetrical distribution to the magnitude boosts the mean hazard because it corresponds to a symmetrical distribution in log frequency. We are adjusting the distribution used in the magnitude perturbation to assure that the mean is close to the national map mean.

We have been investigating how the use of the large background zones can be best quantified in the Monte Carlo simulations. The initial version of the code did not use the background zone as a choice in the draw for seismicity model. The background zone was used later in the code when the seismicity grid was developed in the manner as the national maps using adaptive weighting. We have now modified the code to use the background zone as another branch of the logic tree. We are evaluating how the result compares to the mean from the national maps.

We have developed several ways of speeding up the code. The greatest speed-up was achieved by saving the seismicity grids that were previously recalculated for each site.

All the modifications to the codes and the decisions about variability of the input parameters will be finalized by the end of February. The Monte Carlo runs for the 29 sites will be done in early March.

Sincerely,

Arthur Frankel

cc: M. Mayfield, P. Cross-Prather, D. Dorman