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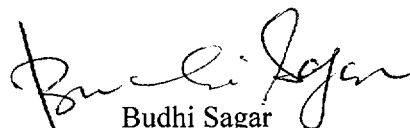
U.S. Nuclear Regulatory Commission  
ATTN: Deborah A. DeMarco  
Office of Nuclear Material Safety and Safeguards  
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Washington, DC 20555

Subject: Submittal of Abstract Successful Eruption Forecasting Before Unrest at Cerro Negro Volcano,  
Nicaragua (AI 20.01402.461.045)

Dear Mrs. DeMarco:

Enclosed is an abstract for presentation at the July 2000 General Assembly of the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI). This abstract is based on work conducted as part of the Igneous Activity KTI project and demonstrates that models developed by CNWRA staff can be used for forecasting the timing of a volcanic eruption years before any sign of unrest. Investigations conducted by CNWRA staff at Cerro Negro volcano form an important basis for review of the DOE safety case. Use of such models in review supports NRC goals of basing licensing decisions on realistic models and data, and enhancing public confidence. Following programmatic acceptance by the NRC, this abstract will be submitted to the IAVCEI organizing committee for presentation in the July meeting. If you have any questions please contact Dr. Brittain Hill at (210) 522-6087 or me at (210) 522-5252.

Sincerely,



Budhi Sagar  
Technical Director

BS/adm  
Enclosure

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**SUCCESSFUL ERUPTION FORECASTING BEFORE  
UNREST AT CERRO NEGRO VOLCANO, NICARAGUA**  
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Cerro Negro is a high-Al basalt cinder cone volcano that has erupted 0.16 km<sup>3</sup> (DRE) of lavas and dispersed tephra falls 23 times since formation in 1850. Petrogenesis at Cerro Negro is controlled by minor olivine+augite+plagioclase fractionation/accumulation. Ten major eruptions ( $>10^6$  m<sup>3</sup> DRE) since 1920 define a steady-state eruption rate of  $2.1 \times 10^{-3}$  km<sup>3</sup>/yr. Repose interval since 1920 regularly follows volume of the preceding eruption. Time-volume relationships would have forecast successfully the 1992 and 1995 eruptions within 1 yr of occurrence. Time-volume relationships in 1998 indicated Cerro Negro was most likely to experience a significant eruption in  $2000 \pm 1$ , with 95% confidence the eruption was forecast to occur  $<2006$  (Hill *et al.* 1998, *GSA Bull.* 110: 1231). The August 1999 eruption of  $1 \times 10^6$  m<sup>3</sup> DRE gives a small deviation from steady-state activity, with 95% confidence a significant eruption now should occur  $<2005$  and is most likely in  $2000 \pm 1$ . Cerro Negro eruption timing reflects the local balance between steady recharge of the relatively nondifferentiating magma system and development of differential tectonic stress following tectonomagmatic strain of the preceding eruption.

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