

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: To present a paper at the General Assembly of the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) Administrative Item 20.06002.01.311.502

DATE/PLACE: November 13–24, 2004
Pucón, Chile

AUTHOR: Donald Hooper, Research Scientist, CNWRA
Center for Nuclear Waste Regulatory Analyses (CNWRA) at Southwest Research Institute® (SwRI®)

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BACKGROUND/PURPOSE: Foreign travel was conducted to present a paper on erosion of tephra deposits at the General Assembly of the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI). The IAVCEI General Assembly is the world's largest conference on volcanism and only convenes every four years in cities near active volcanoes. This meeting brings together the world's experts in volcanology to discuss new developments in volcanic hazard assessment, physical volcanology, and public policy. Presenting the results of these investigations at this international scientific meeting directly supports several NRC goals. Discussion of these models and data provides an opportunity for meaningful peer review and possible improvements to the realism of these calculations. Insights gained from this meeting will help staff develop a technical basis to review DOE information that addresses these contentious volcanological issues. Finally, these presentations support public confidence that the NRC independently develops a wide range of techniques to evaluate important safety issues and that work continues in evaluating technical uncertainties.

SUMMARY OF PERTINENT POINTS/ISSUES: The poster presentation was titled "Geomorphologic Evolution of the Tephra Deposit from Parícutin Volcano, Mexico" and was in Session 6B: "Impact of Volcanic Eruptions on Environment and Society." The focal point of the presentation was a process-level model being developed to evaluate the long-term redistribution of tephra following a scoria-cone (or violent strombolian) eruption. A sediment budget approach is incorporated to model sediment erosion, storage, and transport processes in fluvial systems. Initial modeling efforts have concentrated on the deposits from three scoria cones with different sediment yields: (i) Parícutin, Mexico, with a high sediment yield; (ii) Sunset Crater, Arizona, with an intermediate sediment yield; and (iii) Lathrop Wells, Nevada, with a low sediment yield. Scoria cones such as Sunset Crater show that substantial tephra deposits can persist for 1,000 years, even with a period of accelerated erosion immediately following the eruption. The extent and character of erosion at each location is a complex function of site-specific processes and characteristics. This modeling approach is being applied to the redistribution of contaminated tephra from a possible volcanic eruption at the potential high-level waste repository at Yucca Mountain, Nevada. Appropriate model parameters are being substantiated for expected dryland conditions in the Fortymile Wash drainage system following a modeled eruption at Yucca

Mountain. These investigations presented a new and innovative approach to evaluating tephra remobilization and redistribution processes.

Discussion of these models and data provided an opportunity for meaningful peer review and potential improvements to the realism of these calculations. The poster received a favorable review. Dr. Jon Major of the U.S. Geological Survey noted that he observed a decline in the erosion rate of tephra at Mount St. Helens (Washington) due to the development of a stable rill network. Dr. James Luhr of the Smithsonian Institution was interested in the calculated tephra volumes and Dr. Hugo Delgado Granados of the Universidad Nacional Autónoma de México expressed an interest in reviving erosion studies at Parícutin. Interaction was worthwhile and involvement with the volcanological and geomorphological communities should be continued. Active participation in IAVCEI and similar meetings ensures that NRC licensing decisions can be based on realistic volcanological models and data.

DISCUSSION: The IAVCEI meeting brings together scientists with a knowledge of volcanic hazards and risks, physical volcanology, structural control on volcanism, environmental impacts of volcanic eruptions, and volcano monitoring. Symposia of interest included explosive mafic volcanism, modeling volcanic processes, volcanic hazard mapping, integrated monitoring, remote sensing of volcanoes, and magmatic volatile budgets and controls on magma degassing. Many presentations focused on Chilean and other South or Central American volcanoes. Because of its continuing activity, Soufriere Hills volcano on Montserrat was also a common presentation topic. Insights gained from these discussions help staff prepare a technical basis to review DOE models that address volcanological issues. Regarding remote sensing of volcanoes, thermal imaging continues to be widely utilized.

In addition to conference sessions, I also attended several evening IAVCEI meetings, including the second meeting of the Working Group on Modeling Volcanic Tephra-Fall Hazards, the Commission on Volcanogenic Sedimentation, and the information meeting on Villarrica Volcano: Persistent Degassing and Conduit Processes. The tephra-fall hazard working group was created to evaluate model calibration, data collection, sampling protocol, and tephra hazards. This working group session was well-attended and was characterized by a lively discussion of the tephra database and tephra-dispersal models. The Commission on Volcanogenic Sedimentation concentrates on the origin, transport, deposition, diagenesis, and reworking of volcanic material. This commission, although attended by a smaller number of people, also has relevance for modeling the redistribution of tephra deposits. The information meeting on Villarrica volcano was an energetic session with numerous speakers. Villarrica is an active volcano located less than 20 km from the conference site in Pucón, Chile. Measurements of volcanic gas emissions and conduit processes were the main topics, and reference was made to studies being conducted at Popocatepetl, Mount St. Helens, Masaya, Pu'u O'o, Stromboli, and several Chilean volcanoes. Active participation should be maintained with the tephra hazards and volcanogenic sedimentation groups because tephra deposition and remobilization are a significant component of the Yucca Mountain risk assessment.

The IAVCEI General Assembly traditionally has pre-meeting (not attended), intra-meeting, and post-meeting field trips. The attended trips focused on Villarrica volcano and its deposits. We examined the late Pleistocene-Holocene pyroclastic deposits, including large-volume basaltic-andesite ignimbrites. Recent lahar deposits, as well as the 1971 and 1984 lava flows, were inspected. Also of interest are the more than 30 Holocene scoria or cinder cones located in two clusters on the northeastern and southern flanks of Villarrica volcano. Because of the different

climate regime, these pyroclastic cones are more weathered than their counterparts in southern Nevada.

PENDING ACTIONS/PLANNED NEXT STEPS FOR NRC: No open actions or unresolved issues.

POINTS FOR COMMISSION CONSIDERATION/ITEMS OF INTEREST: The content of this report is not likely to be of interest to the Commission. Results of tephra redistribution modeling were presented at the IAVCEI General Assembly. Redistribution of potential tephra deposits is a significant component of the Yucca Mountain risk assessment and presenting the results of these scientific investigations directly supports several NRC goals. Discussion of these models and data provides an opportunity for meaningful peer review and possible improvements to the realism of these calculations. Insights gained from this meeting will help staff develop a technical basis to review DOE information that addresses volcanological issues. Finally, these presentations support public confidence that the NRC independently develops a wide range of techniques to evaluate important safety issues and that work continues in evaluating technical uncertainties.

ATTACHMENTS:

Attachment 1 contains a copy of two business cards collected during the travel. The cards are from Dr. Hugo Delgado Granados of the Universidad Nacional Autónoma de México and Jun Okada, a doctoral candidate from Hokkaido University.

Attachment 2 is the general meeting agenda.

Attachment 3 is the post-meeting field trip (C-3) agenda.

SIGNATURES:

Donald Hooper
Research Scientist

Date

CONCURRENCE:

H. Lawrence McKague, Manager
Geology and Geophysics

Date

Budhi Sagar
Technical Director

Date

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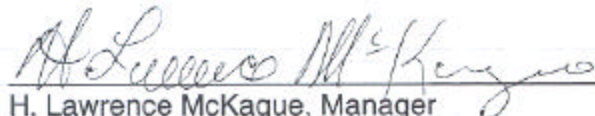
SIGNATURES:



Donald Hooper
Research Scientist

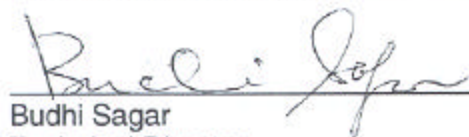
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MEETING GENERAL SCHEDULE

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
	Opening Ceremony Key Note	Oral sessions		Oral sessions	Oral sessions
REGISTRATION	Oral and Poster sessions	Poster sessions	INTRA MEETING FIELD TRIP	Poster sessions	Poster sessions
	Oral sessions	Oral sessions		Oral sessions	Oral sessions
	Poster sessions	Poster and Oral sessions		Poster and Oral sessions	IAVCEI Awards Ceremony
	Ice Break	IAVCEI Plenary session		Evening barbecue	Gala dinner





IAVCEI
GENERAL ASSEMBLY 2004
PUCÓN - CHILE

■ C3.- Explosive postglacial volcanism of Villarrica volcano

Date:	November 20-22 2004 (3 days)
Leader:	J. Clavero (SERNAGEOMIN-Chile)
Place:	Pucón
App. cost:	US \$ 250
Minimum number of participants:	15
Maximum number of participants:	20

Villarrica volcano and Calafquén Lake, Southern Andes

Subject: Postglacial basaltic-andesite explosive activity of Villarrica volcano

Main goals: Look in detail at the postglacial pyroclastic deposits of one of the most active volcanoes of the Southern Andes. We will look at pyroclastic flow, surge and fallout deposits, mainly of basaltic-andesite composition. We will pay special attention to the two largest pyroclastic flow deposits of this volcano: Licán and Pucón ignimbrites (13.7 and 3.7 ka, respectively).

■ Preliminary programme:

- Day 1 (Nov. 20): Visit to Licán Ray and Coñaripe areas, towards the western and southwestern flanks of the volcano.
- Day 2 (Nov. 21): Visit to the northern flank of the volcano, the Ski resort area and the southern shore of Villarrica Lake.
- Day 3 (Nov. 22): Visit to Palguín and Los Nevados area, at the northeastern flank of the volcano. Transport by bus from and to Pucón every day. Overnight at Pucón.

Note: Participants to this field trip are recommended to take their own health and travel insurance. The organising committee will not be responsible of any possible accident occurred during the trip.