STATEMENT OF
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Mr. Chairman and Members of the Subcommittee, thank you for this opportunity to discuss the natural hazard threat that volcanoes pose to international aviation over Alaska, to Alaska's communities, and to the role that the Alaska Volcano Observatory plays in mitigating this hazard. James Quick of the US Geological Survey, on behalf of Acting Director Patrick Leahy, is reporting at this hearing on the national program of volcano hazard mitigation. I would like to focus on some of the special and unusual aspects of this work in the Alaska region by the Alaska Volcano Observatory (AVO), an observatory which itself has some unusual aspects. I am Coordinating Scientist of AVO, and as such lead the University of Alaska portion of the AVO effort. This is an important time for such a report, as we are now dealing with an explosive eruption in Alaska's most populous region, as well as with unrest at other volcanoes. I believe that AVO's successful prediction of and response to the eruption of Augustine Volcano makes the case for continued support of this effort all the more compelling.

Americans tend to think of their 49th state as remote, although remoteness is in the eye of the beholder. A remote place is far from home and usually at the corner of a map. But Earth does not have corners. It surprises people to discover that flights between eastern Asia and North America pass over Alaska, not Hawaii. Thus, some 25,000 people traverse Alaska's skies every day and Anchorage ties Tokyo (Narita) in landed airfreight. Along this route are about 100 volcanoes capable of blasting ash to flight levels, some in Japan, many in Russia, and about half in Alaska. However, Alaska's volcanoes are remote in the sense of getting geophysical equipment installed and getting data out. They provide unforgiving environments for hi-tech instrumentation. These facts, combined with Alaska's small population, define the mission of AVO and explain its areas of international leadership in volcanology.

Of course, it is not enough to justify a program by pointing out a danger. The more important question is whether something can be done to reduce the impact of a natural event in terms of damage to property and loss of life. For volcanoes, this often means getting people out of harm's way, which in turn requires either immediate or preferably advance warning of eruptions. Happily, prediction of eruptions in a useful timeframe is often possible for volcanoes through observation of increased seismicity, subtle inflation, and increased heat and gas output. These changes are detected through surface seismic and GPS networks, through surveillance flights, and through sophisticated satellite remote sensing techniques. In addition to when, it is vital to know how a volcano will erupt, and for this we rely on the lessons of history that geology of the volcano provides.

Ash clouds do not respect immigration procedures, and so comprehensive monitoring requires close coordination with international counterparts. Finally, hazard information must be disseminated widely, freely, and instantly, as is now possible through the Internet and World Wide Web. These activities, then, comprise the Alaska Volcano Observatory. Except for very large eruptions – infrequent but they do happen, and Alaska did have the world's largest eruption of the 20th century in 1912 – potential losses are less than for large earthquakes or hurricanes. But volcanology is a case where a modest investment produces a large benefit in reducing the impact of catastrophic events.

For the airlines, the result of AVO's vigilance is knowing when to cancel flights during an eruption, knowing when it is safe to fly, or knowing when to take on extra fuel and less cargo if diversion may be necessary. Indeed, the availability and reliability of volcano eruption warnings is a factor in cargo airlines choosing to use Anchorage as a refueling stop. For communities, it means when to shut down or protect facilities from ash and how to advise people on health risks.

How does one carry out a sophisticated and diverse monitoring program in a state with a small population? The way Alaskans persevere through other challenges: cooperation. The Alaska Volcano Observatory is unique in the US and probably the world in that it is a thoroughly collaborative undertaking of federal scientists, state scientists, and university faculty and students. There are many rewards to this approach, despite its seeming administrative complexity. As the USGS Acting Director cites, the USGS has a Congressional mandate to mitigate geologic hazards, of which volcanism is an important component. The USGS manages AVO and supports it within its national pool of volcanological talent. The Alaska Division of Geological and Geophysical Surveys (ADGGS) has a similar mandate at the state level, and is naturally more attuned to state priorities. In addition, ADGGS maintains extensive knowledge and databases of state geology, and is a logical choice for disseminating this information to the public. The University of Alaska has the unique role within the partnership of education, both in terms of introducing students to societally engaged science and in producing the next generation of geoscientists. It also provides a fertile intellectual environment that is more difficult to maintain in government agencies. All three partners have their specialties, though they also all participate in the monitoring and scientific aspects of the operation.

Strengths of this unique approach are the diversity of expertise it makes available, the connectedness of the observatory to local communities, government agencies, and the US scientific community, and – most of all from the university's perspective – the involvement of students in exciting science for immediate public benefit. It is worth noting that volcanology programs funded by other agencies such as the National Science Foundation (NSF) and NASA cannot provide this experience because geophysical monitoring, the task of turning geoscience data quickly into information for safety decisions, is solely the mission of the USGS Volcano Hazards Program.

The challenges of Alaska have defined AVO's areas of leadership. We have pioneered the installation of stand-alone geophysical stations that can operate without attention for two to three years in a harsh environment, telemetering real-time seismic and GPS data via radio, satellite, and telephone links to Anchorage and Fairbanks. We have initiated the first operational satellite monitoring of active volcanoes, sometimes catching the very earliest precursory activity because infrared-imaging satellites (for example, weather satellites) can peer down into deep craters. We have contributed much to the scientific community's understanding of how volcanoes work. And we have educated a diverse cadre of talented geoscientists who serve in public, private and academic sectors, not just in natural hazard mitigation and research, but also in acquisition of mineral and energy resources. We have also developed volcanology's most acclaimed web site, which serves the dual purposes of dissemination of hazard information and, for the nation as a whole, science education. We are the most international of observatories, having worked with our Russian colleagues to develop monitoring capabilities first in Kamchatka and now in the Kurile Islands. Russian volcanoes frequently put ash into areas where the US has aviation safety responsibilities. The most amazing fact about AVO is the number of volcanoes geophysically monitored: 30. No other observatory in the world comes close.

For the university, having a strong core program in volcano monitoring leads to success in related areas of endeavor. Spin-offs from this work include a new model for particulate dispersal in the atmosphere; new satellite remote sensing techniques; volcano research drilling in Japan funded by the international scientific community; geothermal energy research in Alaska; and collaborative volcanological education and research in the Russian Far East and Alaska, supported by NSF and the Russian Academy of Sciences and involving students from all over Russia and the US. These NSF programs have opened a new bright window in our common border with Russia.

The immediate challenge for the Alaska Volcano Observatory is adequate funding, not so much in terms of dollars though a modest increase is essential, but in increased stability. The USGS Volcano Hazards Program has not received sufficient funds to cover the expanded role of monitoring volcanoes that threaten only aircraft. Hence, Congress has annually assigned about half of AVO's budget, representing mitigation of the ash hazard to aircraft, to the FAA, which then transfers the funds through the Department of Commerce to USGS. This cumbersome process precludes long-term planning. This year we have a serious funding shortfall just as Augustine Volcano emerged from two-decade slumbers and volcanoes Spurr, Veniaminof, Cleveland, and Korovin became “hot”.

Alaska Volcano Observatory is the most obvious example of the evolving role in natural hazard mitigation of the USGS Volcano Hazards Program. Before AVO, no “remote” volcanoes were monitored. Changing perceptions of remoteness are a natural consequence of increasing human population and changing patterns of human travel, specifically, reliance on long-distance, great-circle-route air travel. Fortunately, evolving technology has kept pace and gives us the tools to mitigate newly recognized hazards. The need for a combination of instrumented vigilance, advances in technology and science of volcano monitoring, and geoscience education will continue as long as humankind exists on this dynamic planet. The benefits are in knowledge gained as well as in property and lives saved.