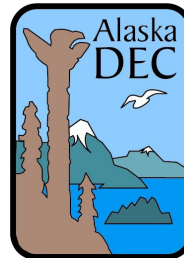


Alaska Interagency Operating Plan for Volcanic Ash Episodes



August 1, 2011

COVER PHOTO: Ash, gas, and water vapor cloud from Redoubt volcano as seen from Cannery Road in Kenai, Alaska on March 31, 2009. Photograph by Neil Sutton, used with permission.

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1.0 Introduction

Drifting ash clouds and ash fall from North Pacific volcanoes can threaten aircraft operations in Alaska and the rest of the Nation. Volcanic ash also can significantly impact Alaskan communities, infrastructure, and human health. A well-coordinated response is required to facilitate the flow of timely and consistent information to those at risk. This Interagency Operating Plan provides an overview of an integrated, multi-agency response to the threat of volcanic ash in Alaska. It presents an agency-by-agency description of roles and responsibilities during volcanic ash events. The plan is supported by standard operating procedures maintained by each participating agency or operating unit.

The agencies involved in this operating plan are: The Federal Aviation Administration (FAA); the Alaska Volcano Observatory (AVO) operated jointly by the U.S. Geological Survey (USGS), Alaska Division of Geological and Geophysical Surveys (ADGGS), and the University of Alaska Fairbanks Geophysical Institute (UAFGI); the National Weather Service (NWS); the Department of Defense (DOD); the State of Alaska, Department of Military and Veterans Affairs, Division of Homeland Security and Emergency Management (DHS&EM); the State of Alaska, Department of Environmental Conservation (DEC) Division of Air Quality and Division of Environmental Health (Drinking Water Program); and the United States Coast Guard (USCG).

This plan covers the State of Alaska and the adjacent United States airspace Flight Information Regions (FIRs). This plan also discusses responsibility for volcanic ash transported from volcanoes outside the United States into Alaskan airspace, such as those in Kamchatka and the Kurile Islands, Russia.

The Interagency Operating Plan for Volcanic Ash Episodes in Alaska is an integral part of the National Oceanic and Atmospheric Administration (NOAA)/FAA Volcano Hazards Implementation Plan that supports the Agreement between NOAA and FAA on volcanic hazards. A Letter of Agreement has added volcano hazards support from the USGS to the NOAA/FAA Agreement. As such, this Alaska plan describes communication links and operational actions necessary to support the NOAA/FAA/USGS Volcano Hazards Implementation Plan. This plan is referenced in the 2007 National Volcanic Ash Operations Plan for Aviation published by the Office of the Federal Coordinator for Meteorological Services (<http://www.ofcm.gov/p35-nvaopa/pdf/FCM-P35-2007-NVAOPA.pdf>).

1.1 Integrated Response to Volcanic Ash

The presence or potential presence of airborne volcanic ash should prompt quick and systematic action among participants of this plan. Each agency is responsible for some aspect of response related to public and flight safety, integrity of military operations, continuity of government, commerce, transportation, or a combination of these. Individual agency priorities may differ slightly and notification protocols vary from agency to agency. However, the objective of this plan is ensuring that those at risk receive timely, consistent information from these varied sources. An integrated response to volcanic ash events involves elements of data collection and processing, information management, and warning dissemination.

1.2 Data Collection and Processing

Each participant agency may be the first to receive a report of volcanic unrest. Timely validation, processing, and dissemination of information are crucial steps in a successful multi-agency response. DHS&EM, AVO, NWS, DOD, and the FAA may receive reports from different sources including remote and *in situ* monitoring instrumentation, trained observers and pilots, law enforcement, municipal workers, or the public. Considering the comparative rarity of volcanic ash events but high potential for catastrophic loss, all reports should be taken very seriously.

Any agency receiving a report of volcanic unrest including the possible eruption of ash should validate the report and relay the information to the NWS and the FAA Anchorage Air Route Traffic Control Center (ARTCC) as soon as possible. It is critical to relay this information quickly because commercial aircraft travel 90 miles in 10 minutes, and ash can reach flight levels in several minutes. Furthermore, airborne ash can begin depositing on surfaces hundreds of miles from the source within a few hours. Both accuracy and speed are essential.

Validation of reports requires calling on the data gathering capabilities of other agencies participating in this plan. For example, if DHS&EM receives a report from law enforcement in Homer that Iliamna is erupting, they should call AVO. If possible, the caller should remain on the line while AVO evaluates monitoring and other data. If an eruption is confirmed, AVO would contact NWS and Anchorage ARTCC (see section 2.2.2.2), freeing DHS&EM to continue with their call-down to the State Emergency Coordination Center, affected political subdivisions, and others (see section 2.1). Alternatively, if AVO receives an eruption report first, they should validate its occurrence (by ground or satellite sensors or contacting Anchorage ARTCC for pilot reports), relay that information to NWS, and proceed with their call-down. In general, the first agency receiving a report of volcanic unrest validates the report, shares the report with formal warning agencies, and proceeds with their own call-down.

1.3 Information Management and Coordination

Agencies relaying information about volcanic ash events, forecast ash cloud trajectory, and potential impacts must deliver a consistent message. However, to ensure rapid dissemination to the aviation community, the Alaska Aviation Weather Unit (AAWU) has the lead role in determining the details of the initial eruption [Significant Meteorological Advisory (SIGMET)]. As time allows, collaboration should take place on all subsequent SIGMETs to ensure consistency and better define the ash plume in time and space. At a minimum, at least one formal coordination call between AVO and NWS should take place each day to share information and discuss issues pertaining to the event. Additional coordination calls should occur as needed depending on the severity of the event (see section 2.1).

1.4 Warning Dissemination

Each agency distributes information to minimize loss of life and property, and the methodology for dissemination varies. National Weather Service uses NOAA Weather Wire, marine High Frequency (HF) and Very High Frequency (VHF) radio, NOAA Weather Radio (NWR), the statewide Alaska television weathercast, and the Emergency Alert System (EAS) in addition to distribution of text and graphics by its own telecommunications Gateway and through telephone facsimile, and the Internet. FAA distributes aviation weather forecasts, advisories and warnings from the NWS, flight information, pilot reports, and terminal information via its Aeronautical Fixed Telecommunications Network (AFTN) data links. The DHS&EM staff can redistribute critical information via the First Class e-mail system, commercial radio, television, cable and Internet service in addition to the Alaska Warning and Alert System (AWAS) and the EAS. The Alaska Volcano Observatory uses the Internet, telephone, and facsimile as primary means for communication. Details of procedures for sharing information are provided in individual agency sections. By using diverse methods to disseminate information, the collective ability to reach as many people as possible is optimized.

2.0 Responsibilities of the Participating Agencies

The following section contains a general outline of each agency's actions in response to volcanic unrest and eruption.

2.1 DIVISION OF HOMELAND SECURITY AND EMERGENCY MANAGEMENT (DHS&EM)

DHS&EM will conduct the following actions upon notification from AVO that any volcano has been upgraded to Code **ORANGE/WATCH** or Code **RED/WARNING**. The purpose of these actions is to coordinate State and municipal actions for a single imminent volcanic event:

- A. Determine the appropriate level of activation for the State Emergency Coordination Center (SECC).
- B. Notify the potentially affected political subdivisions of the situation.
- C. Determine if the potentially affected political subdivisions will activate local emergency operations centers during the Code **ORANGE/WATCH** or Code **RED/WARNING** situation.

D. Determine if any of the above communities would want to participate in a conference call coordinated by DHS&EM pertaining to the Code **ORANGE/WATCH** or Code **RED/WARNING** situation. This conference call will initially include representation from the Alaska Volcano Observatory, the National Weather Service, the Alaska Department of Environmental Conservation (for air quality information), Alaska Department of Health and Social Services (Division of Public Health), and DHS&EM. The purpose of this conference call is to:

- (1) Allow AVO and NWS to provide any additional information on the situation.
- (2) Provide the opportunity for the local communities to ask questions pertaining to the situation.
- (3) Coordinate any local/State actions that may be needed to respond to the situation.
- (4) Determine if an additional coordinating conference call will be needed, at what time, and what agencies or individuals should participate. The conference call will be scheduled approximately 1 hour after an upgrade to **RED/WARNING**. After normal work hours, the conference call will be scheduled as soon as possible, likely a minimum of 2 hours after notification. After an upgrade to **ORANGE/WATCH**, the need for a conference call will be determined after consultation with AVO and the NWS. DHS&EM will verify the name of the local person and the telephone number to be used for this conference call and provide it to the conference call operator.

E. Post situation information on First Class e-mail and other information systems as available.

In addition, DHS&EM will work with the Municipality of Anchorage Department of Health and Human Services (DHHS) and DEC to ensure that appropriate emergency preparedness information is disseminated.

2.2 ALASKA VOLCANO OBSERVATORY (AVO)

AVO is a joint program of the USGS, the UAFGI, and the ADGGS. In keeping with the statutory responsibilities of its component agencies, AVO has two primary objectives:

- A. To conduct monitoring and other interpretive scientific investigations in order to assess the style, timing, duration, and impacts of volcanic activity.
- B. To provide timely and accurate information on volcanic hazards, warnings of dangerous activity, and eruption notifications to local, State, and Federal officials and the public.

2.2.1 Organization

AVO consists of scientists and staff at offices in Fairbanks (UAFGI, ADGGS) and Anchorage (USGS). Geologists and geophysicists at all three agencies share routine data processing, analysis, and hazard communication duties. The AVO facility at the USGS Volcano Science Center in Anchorage serves as the response and operations center during times of increased volcanic activity. Each facility can serve as limited backup to the other.

Managerial responsibility for AVO rests with a Scientist-in-Charge (SIC) and a Coordinating Scientist (CS), as described below. National and regional oversight and coordination are provided by the Regional Executive for Alaska, the USGS Volcano Hazards Program Coordinator in Reston, Virginia, and the Director of the USGS Volcano Science Center in Anchorage, Alaska.

REGIONAL EXECUTIVE (REX) – USGS – ANCHORAGE, ALASKA

The REX is based at USGS in Anchorage Alaska and is responsible for all USGS activities in Alaska by providing senior executive leadership, coordination, and collaboration among the USGS science disciplines.

PROGRAM COORDINATOR (PC), VOLCANO HAZARDS – USGS – RESTON, VIRGINIA

The PC is based at USGS Headquarters in Reston, Virginia, and is responsible for national oversight and funding of the USGS Volcano Hazards Program, which includes the AVO.

DIRECTOR, VOLCANO CENTER (VSC) – USGS – ANCHORAGE, ALASKA

The VSC Director in Anchorage is the lead USGS official in charge of volcano science and observatory operations throughout the United States and thus has managerial responsibility for AVO/USGS staff and operations. The VSC Director facilitates access to national VSC resources during a time of increased activity.

SCIENTIST-IN-CHARGE (SIC) – USGS/AVO – ANCHORAGE, ALASKA

The SIC is a USGS employee based at the USGS Volcano Science Center in Anchorage, Alaska, and is the official spokesperson and line-manager for AVO/USGS staff. The SIC coordinates all AVO monitoring, hazards assessment, and information dissemination and carries a cell phone 24 hours a day. The SIC ensures that (1) monitoring and hazard assessments are thorough and effective; (2) monitoring and hazard data are adequately analyzed and reviewed; and (3) accurate and timely hazard assessments, forecasts, warnings, and supporting scientific information are issued to all concerned parties, including local, State, and Federal officials, and the public.

COORDINATING SCIENTIST (CS), UAFGI/AVO - FAIRBANKS

The CS is based at the UAFGI in Fairbanks and acts as principal liaison between the UAFGI and ADGGS in Fairbanks and the SIC in Anchorage. The CS ensures timely communication of monitoring and scientific information gathered at the UAFGI and/or ADGGS to the SIC and AVO staff.

DUTY SCIENTISTS, USGS/UAFGI/ADGGS/AVO – ANCHORAGE AND FAIRBANKS

Duty Scientists from the AVO staff in Anchorage maintain operational awareness of volcanic activity, respond to inquiries regarding suspected volcanic activity, check for voice messages on the AVO phone, prepare daily status reports and other routine messages, and carry a cell phone 24 hours a day. This position rotates weekly among staff. AVO also maintains a rotating Duty Seismologist, Duty Remote Sensor, and Duty Webmaster to ensure a single point of contact for key elements of monitoring and web page communication; these duty scientists may be located in Anchorage or Fairbanks.

2.2.2 General Operational Procedures

During periods of volcanic quiet, AVO staff acquires, interprets, and archives monitoring data, gathers basic geologic information to develop eruption scenarios, conducts research, outreach, and develops hazard assessments of Alaskan volcanoes. During heightened volcanic activity, AVO at the USGS in Anchorage becomes directly responsible for all AVO activities concerning volcanic unrest and is the principal point of contact for government agencies, the media, and the public regarding information on volcanic activity and hazards assessment. AVO coordinates eruption responses with other USGS Volcano Observatories in the Cascades (CVO), Hawaii (HVO), Long Valley, California (LVO), and Yellowstone (YVO).

AVO issues notification of volcanic activity via telephone call-down to key government agencies (see section 2.2.2.2) as well as e-mail, fax, and web-page postings. AVO communicates with International agencies involved in volcanic ash cloud and ash fall warnings including the Geological Survey of Canada (GSC) and the Canadian Meteorological Centre (CMC). AVO assists in responses to eruptions from Russian volcanoes through operational agreements with the Kamchatka Volcanic Eruption Response Team (KVERT; see section 2.2.5) and the Sakhalin Volcanic Eruption Response Team (SVERT; see section 2.2.6)

2.2.2.1 AVO Hours of Operation and Monitoring Frequency

Normal business hours for AVO are 9:00 a.m. to 5:00 p.m. Monday through Friday. After hours and on weekends, AVO staff can be contacted quickly at any time through an answering service and cell phones.

In 2011, AVO has a program of real-time seismic monitoring at 30 Alaskan volcanoes extending from Mount Wrangell through Cook Inlet, along the Alaska Peninsula and Aleutian Islands (appendixes A and B). Earthquake activity at these 30 volcanoes is checked twice daily. Occasional station outages may reduce the number of monitored volcanoes temporarily.

AVO also conducts daily satellite image analysis for volcanoes in Alaska looking for elevated temperatures or ash clouds that indicate volcanic activity. Satellite data also are checked daily for Kamchatka and portions of the Kuriles.

Four Alaskan volcanoes have real-time deformation instrumentation to detect ground motion related to volcanic unrest. AVO conducts periodic observational overflights, airborne sulfur dioxide, carbon dioxide, and hydrogen sulfide measurements, and other monitoring activities as required. Other remote instrumentation, such as web cameras, pressure sensors, and lightning detection equipment, are installed as needed and as resources allow.

Once a volcano has become restless and is elevated to **YELLOW/ADVISORY** or **ORANGE/WATCH** status (see section 2.2.8), AVO or other VSC staff will examine seismic data at an increased frequency to be determined by the SIC in consultation with staff. Depending on the volcano, AVO also may increase the frequency of satellite image analyses. A daily status report is issued for all volcanoes at **YELLOW/ADVISORY** (see section 2.2.8), or higher. With proper notification, the AVO SIC may choose to suspend daily status reports.

If a volcano reaches **RED/WARNING** (see section 2.2.8), or at any time the SIC determines that the level of activity warrants around-the-clock surveillance, AVO begins an on-site, 24-hour watch in Anchorage or Fairbanks or both locations. The AVO SIC also may call upon personnel from other VSC observatories to assist.

AVO maintains experimental seismic and satellite alarm systems that are capable of notifying staff should monitoring parameters exceed a pre-defined threshold. At this time, these alarms are not considered operational; AVO continues to work on the development of reliable alarms.

2.2.2.2 Volcanic Activity Notifications for Seismically Monitored Volcanoes in Alaska

Continuous recording of seismic activity at Alaskan volcanoes, in combination with other monitoring techniques, usually allows AVO to issue warnings of unrest and the possibility of a volcanic eruption hours to weeks in advance. Notifications of eruptions are issued to our interagency call-down list, usually within minutes of onset at seismically instrumented volcanoes.

Once a seismically monitored volcano becomes restless (for example, shows an increasing level of earthquake or other precursory activity), the following actions are taken:

- A. The SIC will be notified and he/she may choose to activate the call-down procedure immediately or take further action to evaluate the situation.
- B. Initial communication of an increased level of volcanic hazard is by telephone call-down to the full interagency list, and by fax, e-mail, and Internet notification as needed and as new information becomes available. AVO's primary call-down list as of February 1, 2011 is:

CALL-DOWN RESPONSIBILITY OF AVO FOR ALASKAN VOLCANOES (*back-up number)

Call-down responsibility of AVO Anchorage

1. FAA Anchorage Air Route Traffic Control Center	907-269-1103 907-269-1108*
2. NWS Aviation Weather Unit/Anchorage VAAC	907-266-5110
3. NWS Center Weather Service Unit	907-338-1010 907-269-1145*
4. USAF/USA Joint Base Elmendorf-Richardson Command Post	907-552-3000
5. USAF 2 ND Weather Squadron, AFWA, Offutt AFB	402-294-7264
6. NOAA/SAB Washington VAAC	301-763-8444
7. Canadian Meteorological Center/Montreal VAAC	514-421-4635
8. U.S. Coast Guard, Juneau	907-463-2000

Call-down responsibility of AVO Fairbanks

1. DHS&EM SECC	800-478-2337 907-428-7100*
2. Alaska Governor's Office	907-465-3500
3. Fort Wainwright (U.S. Army)	907-353-7535

Call-down messages are brief and include the following general information:

<p>Name of caller Volcano name and location Nature of activity and source of information (seismicity, pilot report, etc.) Aviation Color Code and Volcano Alert Level status or change in status (see section 2.2.7) Start time of event or activity (if known) Height of eruption cloud, how determined, and direction of cloud motion (if known)</p>

Additions or modifications to this call down list may occur with approval of the SIC.

- C. AVO may contact citizens, pilots, mariners, and other contacts at remote sites for additional information, as needed.
- D. AVO will keep in close telephone contact with NWS and FAA so that each agency may provide updates on critical information as it becomes available. Coordination and sharing of information on eruption cloud height and movement is paramount.
- E. A written volcanic activity notification (see section 2.2.3) is transmitted by fax and e-mail and is posted to the AVO web site as soon as possible. At any time, if an eruption is verified and poses a significant hazard to aircraft or a population center, the formal telephone call-down procedure will be repeated.
- F. Call-downs also will occur during each significant change in the status of an eruption or change in aviation color code or alert level (see section 2.2.8).
- G. If warranted, AVO will attempt to fly over and/or land on the volcano to assess the situation. Airborne gas measurements, deployment of portable seismic and other recording instrumentation, increased satellite surveillance, and field visits also may occur depending on the location of the eruption and severity of hazards.
- H. As required, AVO will communicate with appropriate Federal, State, and private land managers who have jurisdiction over the land encompassing the volcano of concern to coordinate access permission and other logistics.

2.2.2.3 Volcanic Activity Notifications for Non-Seismically Monitored Volcanoes in Alaska

AVO does not have seismic monitoring instruments on more than a dozen of the historically active volcanoes of Alaska (appendixes A and B). For these volcanoes, AVO relies primarily on satellite surveillance, experimental monitoring systems, and reporting from other sources including mariners, flight crews, local citizens, and others. Thus, detection and notification of unrest and eruptive activity may be delayed, and future activity cannot be accurately forecast.

If AVO receives a report of or detects a possible eruption at a seismically unmonitored volcano, the following actions are taken, usually concurrently:

- A. The SIC will be notified and he/she may choose to activate the call-down procedure immediately or take further action to evaluate the situation.
- B. Satellite data, distant seismic data, and other information are analyzed to determine whether volcanic activity can be verified. Telephone contact with nearby communities may be attempted.
- C. Descriptions of past eruptions at a given volcano, maintained in archives and databases at AVO, will be reviewed as indicators of likely activity.

- D. Phone contact is made with the FAA and NWS to alert both agencies to the situation and to the possible need for pilot reports and heightened vigilance.
- E. Procedures are then followed as for seismically instrumented volcanoes, as appropriate.
- F. As required, AVO will communicate with appropriate Federal, State, and private land managers who have jurisdiction over the land encompassing the volcano of concern to coordinate access permission and other logistics.

2.2.3 Written Volcanic Activity Notices

AVO's component agencies have a responsibility to notify authorities and the public of potentially hazardous volcanic activity in Alaska. As needed, AVO also will assist in disseminating information regarding hazardous volcanic activity in Russia. The following text products are currently used by AVO to issue notifications of volcano hazards or other information; all are posted on the AVO web site. Users may subscribe to customized, email delivery of these products by visiting this URL: <http://volcanoes.usgs.gov/vns/>.

Volcanic Activity Notice (VAN)

Upon verification of an eruption and following the call-down procedure, a formatted text message describing the location, time, type, size of the eruption, and likely hazards is distributed by AVO to Federal, State, and local government agencies, the media, members of the public and private sectors including airlines, by Internet fax service and e-mail systems. This message, called a Volcanic Activity Notice (VAN), also is immediately posted to the AVO web site. Additional VANs are released as needed, depending on changes in volcanic activity, alert levels, or hazards. VANS are used to declare the 'all clear' when an eruption is waning or has ceased.

Volcano Observatory Notice for Aviation (VONA)

A VONA is a derivative product of the VAN and contains information in a format specifically intended for aviation users of volcano hazard information.

Daily Status Report

AVO typically issues a Daily Status Report for any Alaskan volcano at an elevated alert level or elevated aviation color code. This procedure may be suspended for chronic, low-level unrest at the discretion of the SIC and upon appropriate notification of Interagency partners and the public. These daily reports are posted to the AVO web site, sent by email to interested parties, and faxed to CWSU and AAWU.

Weekly Update and Other Information Statements

AVO issues a weekly summary of volcanic activity in Alaska each Friday. These reports are posted to the AVO web site, sent by e-mail to interested parties, and are faxed to recipients upon request. AVO also issues other non-scheduled Information Statements that announce new monitored volcanoes, significant operational changes, or offer expanded analyses of volcanic unrest and likely scenarios.

Informal Web Updates and Use of Social Media

As needed, AVO may institute a web-only update message to provide users with a very brief, time-appropriate comment on the status of an erupting volcano. AVO may make use of Twitter or other social media to distribute informal updates in a more timely fashion during volcanic events.

Recorded Telephone Message and Web Site

AVO maintains a recorded phone message line (907-786-7478) that will be updated frequently during significant eruptive activity. Timely detailed information about the status of activity at Alaskan volcanoes can be found at the AVO web site <http://www.avo.alaska.edu> or the USGS Volcano Hazards site: <http://volcanoes.usgs.gov>.

Ash Fall Reporting

AVO solicits information from the general public about ash fall events to help track ash fall in real time and to conduct studies of eruptions and ash fall processes. AVO encourages the public to make use of detailed instructions available on the AVO web site (<http://www.avo.alaska.edu/ashfall.php>). Information received on ash fall will be shared with the NWS to assist in updating formal ash fall warning products (see section 2.5.1.3). USGS is developing a graphical ash fall forecast product that will be used to support these ash fall warning statements.

2.2.4 Satellite Alarms, PUFF Model, Volcanic Ash Tracking Tools, Aerosol Sampling, and Other Capabilities at AVO

UAFGI-AVO provides access to near-real time to satellite imagery of the North Pacific from the Kuriles, through Kamchatka, along the Aleutians, into the Alaska mainland and the Cascades to assist with volcano monitoring and eruption response. These satellite data are accessible through Web Tools (<http://avo.images.alaska.edu/tools/>) and include: Image Flipper, Hotspot Viewer, 24 hour Ash Composites, Puff Modeling, and other tools.

UAFGI-AVO also maintains experimental satellite-based alarm systems that alert users of increase in surface temperatures and the presence of volcanic ash clouds. These systems provide email and text alerts describing the activity to AVO staff. The UAFGI-AVO Duty Remote Sensor is responsible for reviewing alarm activity and will contact the AVO Duty Scientist if the activity warrants further action.

UAFGI-AVO maintains and shares the PUFF volcanic ash transport and dispersion model as a tool for assessing the movement of and visualizing potential ash cloud motion. PUFF model runs are generated automatically, 24 hours a day, for elevated alert volcanoes (more than 30 world-wide) and the most active volcanoes in the North Pacific based on their recent activity. Other volcanoes can be added upon request through the AVO public web site or through puff.vatd@gmail.com and all Puff model simulations are available at <http://puff.images.alaska.edu>.

AVO can deploy volcanic ash and aerosol sampling equipment near a volcano and/or between a volcano and a population center to help assess potential human health hazards associated with airborne volcanic ash. This equipment will be used in conjunction with PUFF model runs and other real-time aerosol concentration data to provide warning that ash of a breathable size is or will be impacting a populated area. Deployment of samplers will be coordinated with the DEC Division of Air Quality (DEC/AQ) and data will be shared with the DEC/AQ to support their air quality alerts as needed. UAFGI-AVO also can provide rapid quantitative compositional analyses of volcanic rocks to assist with eruption response and analysis.

USGS-AVO can deploy a Doppler weather radar in communities or facilities within 100 km (62 mi) of an erupting volcano to aid in rapid identification of ash producing eruptions and determination of accurate cloud heights.

2.2.5 Kamchatka Volcanic Eruption Response Team (KVERT)

KVERT is composed of scientists from the Institute of Volcanology and Seismology (IVS) and the Kamchatkan Branch of Geophysical Services (KBGS) located in Petropavlovsk-Kamchatsky. As of 2011, 11 volcanoes of the Kamchatka Peninsula and Paramushir Island in the northern Kuriles are seismically monitored (see appendixes C and D). KVERT also receives occasional ground observer reports from several field stations and daily satellite data for Kamchatka and the northern Kuriles. AVO shares satellite monitoring results and observations of Russian volcanoes with KVERT and maintains situational awareness of volcanic activity in Russia. However, KVERT is the authoritative source of information regarding volcanic activity in Kamchatka and on Paramushir Island and is the only authority that will assign or change Aviation Color Codes for volcanoes in their jurisdiction. KVERT frequently sends e-mail alerts of volcanic activity to a standing list of aviation and meteorology authorities in the region including Anchorage Volcano Ash Advisory Center (VAAC), AVO, Tokyo VAAC, and many others. AVO staff will assist with analysis and interpretation of Russian volcanic activity, principally using remote sensing tools, as needed.

KVERT prepares a weekly Information Release describing the status of Kamchatkan volcanoes that is sent by e-mail to many recipients, usually on Thursdays. These notices are posted on the KVERT web site at http://www.kscnet.ru/ivs/kvert/index_eng.php. Requests to be added to this email distribution can be sent to: girina@kscnet.ru. AVO posts KVERT information to AVO's web site and currently faxes KVERT Information Releases to a list of interested parties.

In the event of a major eruption, KVERT immediately phones the Hydrometeorological Survey at Elizovo Airport near Petropavlovsk (also known as the Aviation Meteorology Center), the Department of Civil Emergencies, Russian media, and local officials. An Aviation Color Code is assigned in an Information Release sent by KVERT via e-mail. AVO in turn sends KVERT notifications by fax to interested parties and posts the information on the AVO web site. KVERT releases additional updates and makes domestic call-downs as needed, depending on changes in volcanic activity or hazard.

2.2.6 Sakhalin (Kurile) Volcanic Eruption Response Team (SVERT)

The Sakhalin Volcanic Eruption Response Team was established in 2004 to provide routine observations of the southern and central Kurile Island volcanoes in the Russian Far East (appendixes E and F). SVERT scientists are based at the Institute of Marine Geology and Geophysics in Yuzhno-Sakhalinsk. They report analyses of MODIS and other satellite imagery of the Kuriles via e-mail to AVO and others usually on a daily basis, Monday through Friday. SVERT uses the same Aviation Color Code as KVERT and AVO to indicate the level of concern for activity at a Kurile volcano. SVERT has no formal operational budget and is actively seeking support from the Russian government.

There are no real-time seismic networks on any Kurile volcano other than Alaid on Atlasova Island near the south tip of Kamchatka. SVERT has a written eruption response plan that includes telephone notification of Air Traffic Control and Aviation Weather authorities in Sakhalin, and e-mail notification to AVO, the Anchorage and Tokyo VAAC, and others if any sign of volcanic activity is detected. Requests to be added to this list can be sent to: chibisova@imgg.ru.

In the event of a significant Kurile eruption, AVO will follow procedures similar to those for an eruption in Kamchatka. AVO posts SVERT notices to the AVO web site.

AVO in Anchorage conducts a call-down to the list below upon receiving information that a Russian volcano has had a significant eruption (generally for ash above 8 km or 26,000 ft) or important change in an ongoing eruption. For continuous or chronic eruptions in the Russian Far East, calls will be made only when AVO considers the activity to be a significant and hazardous change.

CALL DOWN RESPONSIBILITY OF AVO FOR SIGNIFICANT RUSSIAN VOLCANIC ACTIVITY
(*back-up number)

1. FAA Anchorage Air Route Traffic Control Center	907-269-1103 907-269-1108*
2. NWS Aviation Weather Unit/Anchorage VAAC	907-266-5110
3. NWS Center Weather Service Unit	907-338-1010 907-269-1145*
4. USAF/USA Joint Base Elmendorf-Richardson Command Post	907-552-3000
5. USAF 2 ND Weather Squadron, AFWA, Offutt AFB	402-294-7264
6. NOAA/SAB Washington VAAC	301-763-8444
7. Canadian Meteorological Center	514-421-4635
8. US Coast Guard Juneau	907-463-2000
9. DHS&EM SECC	800-478-2337 907-428-7100*

2.2.7 Coordination with Other Agencies

AVO maintains frequent telephone contact with NWS, FAA, DOD, DHS&EM, USCG, DEC, and other concerned Federal, State, and local agencies to ensure effective communication of observational data and consistent interpretations of volcanic activity and hazards.

AVO's responsibility overlaps and integrates with that of NWS once an ash cloud has been generated, is drifting with the wind, and has the potential to produce ash fall. AVO and NWS strive to communicate frequently to ensure consistent messages regarding ash cloud height, motion, and potential impacts (including ash fall). AVO and NWS work together to ensure formal NWS warning messages (for example, ash fall advisories, marine weather advisories, SIGMETs, etc.) and AVO volcanic activity notifications are well-coordinated and as accurate as possible.

AVO will coordinate as needed with appropriate Federal (USFWS, NPS), State (DNR), and private land managers who have jurisdiction over the land encompassing the volcano.

2.2.8 Aviation Color Code and Volcano Alert Level Terms

US Volcano Observatories utilize a dual system of alerts. To address aviation hazards, US Observatories use an Aviation Color Code. US Observatories also issue a Volcano Alert Level to indicate the overall status of the volcano and its ground-based hazards (for example, ash fall, lahar or mudflow, pyroclastic flow) that employs the terms '**NORMAL, ADVISORY, WATCH, and WARNING**'. Definitions of these terms are shown in the tables that follow. Changing aviation color codes and volcano alert levels indicate increasing severity and likelihood of potential impacts and are similar to those used by NWS for severe weather alerts.

The SIC, in consultation with the CS, also may assign an aviation color code and alert level to a volcano that is not seismically monitored based on its past eruptive history, pilot or ground-based observations, and/or remote sensing data. However, non-seismically monitored volcanoes can never be in aviation color code **GREEN**/ alert level **NORMAL** because we cannot definitively say the volcano is quiet. AVO will not be able to track increases in seismic activity at volcanoes without a seismic network and, in most cases, will not be able to issue warning or notification of an impending eruption.

VOLCANO ALERT LEVELS

NORMAL	<p>Typical background activity of a volcano in a non-eruptive state.</p> <p><i>Or, after a change from a higher level:</i></p> <p>Volcanic activity considered to have ceased, and volcano reverted to its normal, non-eruptive state.</p>
ADVISORY	<p>Elevated unrest above known background activity.</p> <p><i>Or, after a change from a higher level:</i></p> <p>Volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.</p>
WATCH	<p>Volcano is exhibiting heightened or escalating unrest with increased potential for eruptive activity.</p> <p><i>Or:</i></p> <p>A minor eruption is underway that poses limited hazards.</p>
WARNING	<p>Highly hazardous eruption underway or imminent.</p>

AVIATION COLOR CODES

Aviation color codes indicate the likelihood or presence of airborne ash and ash clouds that threaten aircraft.

GREEN	<p>Volcano is in a normal, non-eruptive state.</p> <p><i>Or, after a change from a higher level:</i></p> <p>Volcanic activity considered to have ceased and volcano reverted to its normal, non-eruptive state.</p>
YELLOW	<p>Volcano is exhibiting signs of elevated unrest above known background levels.</p> <p><i>Or, after a change from a higher level:</i></p> <p>Volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.</p>
ORANGE	<p>Volcano is exhibiting heightened unrest with increased likelihood of eruption.</p> <p><i>Or:</i></p> <p>Volcanic eruption underway with no or minor ash emission.</p>
RED	<p>Eruption is forecast to be imminent with significant emission of ash into the atmosphere likely</p> <p><i>Or:</i></p> <p>Eruption is underway with significant emission of ash into the atmosphere.</p>

2.2.9 Designation of Authority

The Federal Government, through the Stafford Disaster Relief and Emergency Assistance Act of 1974 (Public Law 93-288), states that the U.S. Geological Survey (USGS) has been delegated the responsibility to issue disaster warnings "... for an earthquake, volcanic eruption, landslide, or other geologic catastrophe."

The Alaska State Legislature has similarly directed that the Alaska Division of Geological and Geophysical Surveys (ADGGS) conduct scientific investigations to assess geologic hazards to buildings and transportation facilities (AS 41.08.020).

The Geophysical Institute of the University of Alaska Fairbanks (UAFGI) is instructed to collect and archive seismic data on volcanic eruptions, to assess eruption hazards, and to inform the public, public officials, and industry of risks to lives and property (AS 14.40.075).

The MOU establishing the Alaska Volcano Observatory coordinates fulfillment of these State and Federal obligations among the USGS, ADGGS, and UAFGI.

2.3 DEPARTMENT OF DEFENSE (DOD)

The 611th Air Operations Center's Weather Support Team (611 AOC/CODW) at Joint Base Elmendorf-Richardson (JBER) has DOD coordination responsibility for this plan. Additionally, CODW provides volcano staff updates to Alaskan Command (ALCOM), Joint Task Force Alaska (JTF-AK), Alaskan North American Aerospace Defense Command Region (ANR), and 11th Air Force.

The 673d Air Base Wing Command Post (673 ABW/CP) has the responsibility of informing key personnel at JBER. The 673 ABW/CP also notifies the 17th Operational Weather Squadron (17 OWS) at Hickam AFB, HI; Clear Air Force Station; Eareckson Air Station Control Center; and the 354th Fighter Wing Command Post (354 FW/CP) at Eielson AFB. In the event of a significant volcanic eruption, the 17 OWS will ensure aircrews requesting remote weather briefings are made aware of the estimated horizontal and vertical extent of the ash cloud.

The 354 FW/CP has the responsibility of informing key personnel at the 354 FW and the 168th Air Refueling Wing (168 ARW) of volcanic activities affecting Eielson AFB and pilots flying the North Pacific (NOPAC) routes.

The United States Coast Guard has the responsibility of informing their key personnel.

NOTE:

The 2d Weather Squadron (WS), Air Force Weather Agency (AFWA) at Offutt Air Force Base has the responsibility of informing key personnel at the US Northern Command's Domestic Warning Center, Peterson AFB, Colorado, North American Aerospace Defense Command, Peterson AFB, Colorado and Air Mobility Command's Tanker Airlift Control Center, Scott AFB, Illinois of any volcano activity which may affect their operations.

2.3.1 Procedures

The 611 AOC/CODW will coordinate to provide satellite imagery from the Defense Meteorological Satellite Program (DMSP) polar orbiting satellites. DMSP imagery will be made available through normal communication means, and will be provided as long as no scheduling conflicts occur with Air Force mission requirements. In case of a conflict, Air Force requirements will be met first, and any excess satellite time will be devoted to volcanic activity imaging.

The 17th OWS and weather units from JBER (3 OSS/OSW), Eielson AFB (354 OSS/OSW), and Fort Wainwright (3 ASOS) will transmit, over normal communications channels, both civilian and military aviation weather circuits, any pilot weather reports (PIREPs) they receive containing volcanic activity information and will encode them as Urgent PIREPs (UUA) in accordance with Air Force Manual 15-124.

2.4 FEDERAL AVIATION ADMINISTRATION (FAA)

The FAA Anchorage Air Route Traffic Control Center (ARTCC) collects and disseminates volcanic information received from various sources, including AVO, the FAA Regional Operations Center (ROC), the Air Force Regional Air Operations Center (RAOC), the Anchorage VAAC, the Tokyo VAAC, KVERT, SVERT, airline operators, pilot reports (PIREPs), other FAA facilities, or the public. The FAA does not generate primary information pertaining to volcanic ash episodes, nor track or predict volcanic ash cloud movement. The FAA relies on information provided by NWS, AVO, and pilot reports for current and forecast conditions.

2.4.1 Procedures

The Alaskan Region FAA contact is the Anchorage ARTCC Watch Supervisor. The Anchorage ARTCC Watch Supervisor can be contacted at 907-269-1103.

Upon receiving notification of an eruption or possible eruption:

A. Watch Supervisor will:

- 1) Verify the occurrence of volcanic activity with the AVO.
 - a. Non Eruptive event (Cook Inlet - Augustine/Iliamna/Redoubt/Spurr)
 - i. If the AVO advises there is increased seismic or other precursory activity of a Cook Inlet volcano, but an eruptive event has **not** occurred, issue an Increased Volcanic Activity NOTAM and notify personnel and facilities as listed in 2.4.1 A. 2).a). If the aviation color code has been elevated to “**ORANGE**” or “**RED**” notify personnel and facilities listed in 2.4.1 A.2).b) as well.
 - b. Non Eruptive event (All other volcanoes)
 - i. If the AVO advises there is increased seismic or other precursory activity of any volcano from anywhere other than Cook Inlet, but an eruptive event has **not** occurred, issue an Increased Volcanic Activity NOTAM and notify personnel and facilities listed in 2.4.1 A.2).a).
- 2) Take the following action if a volcanic eruption is verified by the AVO.
 - a. All volcanoes, notify:
 - The Center Weather Service Unit (CWSU). If an eruption occurs when the CWSU meteorologist is not on duty, the Weather Coordinator (WC) will issue an Urgent Pilot Report (UUA), contact the Alaska Aviation Weather Unit (AAWU) and if required, contact a CWSU Meteorologist to report immediately to Anchorage Air Route Traffic Control Center (ARTCC).
 - Frontline Manager (FLM)/Controller-in-Charge (CIC).
 - Regional Operations Center (ROC).
 - Traffic Management Unit (TMU).

b. Cook Inlet volcano or other volcanic eruptions affecting air traffic within ZAN FIR, notify:

- Anchorage ARTCC Air Traffic Manager (ATM).
- Anchorage ARTCC Staff Manager.
- Traffic Management Officer (TMO).
- Operations Manager (OM) of affected area.
- Flight Service Station (FSS) closest to the volcanic activity.
- Anchorage Approach (A11) Watch Supervisor.
- Service Operations Center (SOC).
- Air Traffic Control System Command Center (ATCSCC).

c. Issue an FDC Flight Restriction NOTAM (TFR) if it is determined that the volcanic event could endanger airborne aircraft and occupants.

d. Designate a Weather Coordinator (WC) if necessary.

e. Issue a Volcanic Ash Advisory NOTAM, including the aviation color code “**ORANGE**” or “**RED**”, if any ash may be present.

f. When requested by AVO, assist them in relaying and/or obtaining information from KVERT through coordination with Petropavlovsk-Kamchatsky ACC.

B. FLM/CIC will:

- 1) Ensure that PIREPs are solicited by controllers and recorded on a PIREP form.
- 2) Disseminate NOTAM, PIREP, TFR, MIS, SIGMET, and current conditions information to controllers on duty.

C. Traffic Management Unit will:

- 1) Provide assistance to the Watch Supervisor as needed.
- 2) Evaluate the areas impacted by volcanic activity to determine if any Traffic Management Initiatives (TMIs) are required.
- 3) Prior to initiating TMIs, advise the Watch Supervisor and FLM/CIC.
- 4) Coordinate TMIs with affected facilities and the ATCSCC.
- 5) Monitor the affected area and any resulting TMIs, and modify as needed.
- 6) Request AVO to participate in Telcons to provide volcanic activity updates as needed.

D. Controllers will:

- 1) Ensure that all aircraft in the affected area are aware of the most current information available concerning the volcanic eruption and any resultant ash dispersal.
- 2) With pilot concurrence, suggest headings or reroutes around known ash or possible ash cloud locations.
- 3) Assist VFR aircraft to the extent possible in avoiding known ash cloud locations.
- 4) Solicit PIREP information and record on a PIREP form. Forward this information to the FLM/CIC.
- 5) Broadcast information received relating to the volcanic event/ash drift.

2.5 NATIONAL WEATHER SERVICE (NWS)

Alaska NWS offices (AAWU, CWSU, WFOs, and WSOs) provide the Alaska aviation community, other government agencies, and the public with forecasts and warnings for volcanic ash in the atmosphere, including ash fall forecasts. Meteorological information beyond the level of the forecast also is provided to the Alaska Volcano Observatory (AVO), FAA, DOD (Air Force), and DHS&EM. These meteorological details consist of: satellite imagery interpretations of ash plume boundaries, ash plume top measurements, ash plume movement from radar, forecasts, and warnings for the location of volcanic ash in the atmosphere, and summaries of pilot reports containing volcanic ash information.

In Alaska, detection of ash plumes and confirmation of ash plume height and direction are done in collaboration with internal NWS offices (AAWU, CWSU, and WFO) and external partners (AVO). The Alaska Region's Regional Operations Center (ROC) will provide support to the NWS field offices and ensure that upper management is briefed during a high impact significant volcanic ash event.

2.5.1. NWS Offices

2.5.1.1 Alaska Aviation Weather Unit (AAWU)

The AAWU is the only International Civil Aviation Organization (ICAO) Meteorological office in the world that is both a Volcanic Ash Advisory Center (VAAC) and a Meteorological Watch Office (MWO). The Volcanic Ash Advisory Center is the NWS lead for all Volcanic Ash warnings, advisories, and forecasts.

The VAAC portion of the AAWU consists of the Alaska FIR boundaries and the far northeast Russia, north of 60 degrees North latitude and east of 150 degrees East longitude. Worldwide, VAACs consist of nine offices and are a designation of the ICAO.

VAACs issue Volcanic Ash Advisories (VAA), which are informational messages about volcanic eruptions. The Anchorage VAAC disseminates VAAs through the NWS Telecommunications Gateway.

AAWU MWO (another designation ICAO) responsibilities are limited to the Alaskan FIR. MWO offices issue Volcanic Ash International SIGMETs and disseminate them to aviation customers through the NWS Telecommunications Gateway.

2.5.1.2 Center Weather Service Unit (CWSU)

The Anchorage CWSU (1 of 21 CWSUs in the United States), located at the FAA's Anchorage ARTCC is staffed by NWS meteorologists and operates 15 hours a day (5:30 a.m. to 9:00 p.m. local time) during normal "full staffing" operations. The Anchorage CWSU staff prepares and disseminates routine (UA) and Urgent (UUA) PIREPS, Center Weather advisories (CWA), Meteorological Impact Statements (MIS), and graphical Volcanic Ash MISs.

The CWSU relays pertinent information to Air Traffic Managers via on-demand briefings, internally and externally disseminated UUAs, SIGMETs, CWAS, MISs, and graphical volcanic ash MISs. The graphical volcanic ash MIS is disseminated to an FAA specified list of users via facsimile.

2.5.1.3 WFOs and WSOs

Weather Forecast Offices (WFO) and Weather Service Offices (WSO) in Alaska participate in the volcanic eruption response by issuing volcanic ash fall statements, advisories, and warnings to the public. These offices also share observations of eruptions and the resulting volcanic ash fall with AVO and other agencies as needed. WSOs assist in coordinating information (e.g., soliciting ash fall reports) and briefing local communities on the volcanic ash events.

2.5.1.4 ALASKA REGIONs REGIONAL OPERATIONS CENTER (ROC)

The NWS Alaska Regional Operations Center (ROC) will become activated during significant, high impact volcanic ash events over the State of Alaska. The ROC will provide support to the NWS field offices, help to facilitate interagency collaboration telephone conferences, and provide NWS, NOAA, and DOC leadership with frequent reports on the event.

2.5.2 NWS Products and Services

2.5.2.1 Alaska Aviation Weather Unit (AAWU)

A. Products

SIGMET: The AAWU, as an International MWO, issues volcanic eruption and volcanic ash SIGMETs. The SIGMET serves as the primary warning product to the aviation community of the hazard of volcanic ash. The initial eruption or ash SIGMET is issued as soon as possible and ideally within 5 minutes from the time of notification of volcanic ash impacting the Anchorage FIR and may contain limited information. If it is determined that volcanic ash is present, a follow-up SIGMET identifies the spatial and vertical extent of a volcanic ash hazard for a 6-hour period. A SIGMET is canceled as soon as it is reliably confirmed an ash hazard no longer exists in an area.

Volcanic Ash Advisory (VAA): In an ash event, the AAWU, as the Anchorage VAAC, issues a VAA, which serves as a guidance product to the aviation, meteorological, and volcanological community. A VAA product contains information on the volcano, volcanic eruption, current aerial and vertical extent of ash, a forecast of the ash hazard 18 hours from issuance time, and any other pertinent information. The VAA is issued every 6 hours with updates as necessary. In an ash event where ash is approaching the Anchorage VAAC airspace, the Anchorage VAAC will issue a Near VAA, which alerts customers and partners of approaching ash. The Near VAA provides information about the current VAA issued by the neighboring VAAC.

B. Services

The AAWU will act as NWS Anchorage Forecast Center (AFC) liaison to the AVO. In addition, they provide estimated plume height information to the AVO when a volcanic eruption is detected on Doppler radar. Through the GOES-R project, multi-spectral satellite analysis using MODIS imagery can now provide additional information on ash height, concentration, and atmospheric residency times.

2.5.2.2 Center Weather Service Unit (CWSU)

A. Products

Urgent Pilot Report (UUA): A UUA for an eruption is disseminated long-line by the CWSU immediately upon notification of a volcanic eruption. Russian volcanic eruptions are issued under the Cold Bay Identifier (CDB) and Alaskan volcanic eruptions are issued under the Anchorage Identifier (ANC). Weather Coordinators at Anchorage ARTCC perform PIREP dissemination internally and externally during times of Weather Coordinator activation.

Center Weather Advisory (CWA): The CWA, similar to the SIGMET, contains information about eruptions and location of volcanic ash for a 0–2 hour period. The CWA is an in-flight aviation weather warning for pilots, air traffic controllers, and ARTCC operational staff. The CWA should be issued for volcanic activity that is below SIGMET criteria but still merits attention by aviation operations.

Meteorological Impact Statement (MIS): The MIS is similar to the CWA in that it contains information about eruptions and the location of volcanic ash, but it is not a warning product and is issued for a 0–12 hour period. The MIS is an aviation weather advisory for Air Traffic Managers.

Graphical Volcanic Ash MIS: The Graphical Volcanic Ash MIS is a graphical representation of volcanic ash location and forecasted aerial coverage up to 12 hours. Graphical MIS is issued when an AAWU SIGMET or VAA has not been issued. Once an AAWU SIGMET or VAA is issued, the Graphical MIS is no longer in effect.

B. Services

The CWSU's primary mission is to support Air Traffic Management decisions. The CWSU provides on-demand briefings during volcanic ash eruptions and distributes UUAs, AAWU warning products (i.e., VAA, SIGMET), and CWSU warning products (i.e., Graphical Volcanic Ash MISs) to the appropriate Air Traffic Manager and/or sector.

2.5.2.3 Alaska Region Weather Forecast Office (WFO) and Weather Service Office (WSO)

A. Products

Public and Marine Ash Fall Statements: Public and/or Marine Ash Fall Statements are advisory products designed to alert the public when ash fall is expected in the WFO and/or WSO area of responsibility. This advisory contains the spatial extent and progress of the ash as coordinated with other NWS products and the AVO.

B. Services

The WFO and WSO provide support for the AAWU and CWSU by soliciting spotter and/or pilot reports, monitoring radar and satellite observations, and forwarding all pertinent information to the AAWU and CWSU. The WFO and WSO also respond to public inquiries during a volcanic eruption.

2.5.2.4 Ocean Prediction Center (OPC)

A. Products

High Seas Forecast: The OPC will issue a statement regarding ash fall hazard in the High Seas Forecast that is disseminated via SafetyNet, a satellite-based service; this includes all coastal Alaska WFO areas. OPC will coordinate as needed with the WFO and the AVO to ensure the statements contain up to date information about expected ash fall and other potential impacts.

2.5.3 NWS Collaboration

Observations indicating a volcanic eruption or the presence of volcanic ash can be incomplete and/or highly uncertain. Exchange of information between the AAWU, AVO, CWSU, ARTCC, DOD (Air Force), the NWS AWC in Kansas City, other VAACs, the WFOs, etc., is vital in determining the extent and severity of a volcanic ash event.

2.5.3.1 NWS Collaboration Partners

The AAWU is the primary NWS liaison for volcanic ash forecasts and warnings. However, the AAWU, CWSU, and WFO collaborate with many of the same internal and external partners resulting in some overlap in the following descriptions.

A. Internal NWS Partners

AAWU/CWSU: The AAWU and CWSU collaborate on possible and confirmed volcanic eruptions that may affect (or are affecting) the Alaskan FIR, the products that are the most appropriate for the situation, and on the details of those products (aerial coverage, height, direction, etc.). The CWSU also solicits PIREPs and forwards critical information to the AAWU.

AAWU/CWSU/WFO/WSO: The AAWU and Alaska Region WFOs and WSOs collaborate when a volcanic eruption may result in ash fall over populated and/or active ground based areas (including marine). Collaboration includes information sharing on the volcano's activity (spotter reports, PIREPs, radar analysis, AVO information, etc.) and volcanic ash fall forecasts and warnings. The WFOs and WSOs pass along pertinent information to AAWU and CWSU.

AAWU/Washington VAAC (composed of the NCEPs Senior Duty Meteorologist and the National Environmental Satellite, Data, and Information Service's Satellite Applications Branch): AAWU collaborates with the Washington VAAC during the running of the Volcanic Ash Forecast Transport and Dispersion (HYSPLIT) model, satellite imagery interpretation, transfer of VAAC responsibility, and/or the ending of an event.

AAWU/AWC/Washington VAAC - Kansas City, Missouri: AAWU collaborates with the AWC and Washington VAAC on Volcanic Ash SIGMETs near and over the Oakland FIR.

B. External NWS Partners

AAWU/CWSU/WFO/AVO/KVERT/SVERT: The AAWU, CWSU, and WFO receive and/or request information from AVO (or KVERT or SVERT) for geologic information such as seismic data, ground-based observations, and preliminary estimation of plume height and/or direction. AVO also provides background knowledge of eruptive history and type of eruptions that can be expected. Collaboration on satellite imagery interpretation also may occur.

AVO also can provide information on suspected volcanic eruptions occurring on the Kamchatka Peninsula/Kurile Islands of Russia.

WFO/AVO: The WFO collaborates with AVO when determining ash fall potential over populated areas, including marine areas.

AAWU/CWSU/FAA Automated Flight Service Stations/Flight Service Stations, and FAA Air Traffic Control Towers: AAWU and CWSU contact Automated Flight Service Stations, Flight Service Stations, and FAA Air Traffic Control Towers to solicit additional PIREPs or other volcanic information (spotter reports) as well as to share volcanic information, products, and warnings.

AAWU/CWSU/FAA Anchorage Air Route Traffic Control Center (ARTCC): CWSU (AAWU if CWSU is closed) solicits PIREPs and shares volcanic information, products and warnings, with FAA Anchorage ARTCC Air Traffic Managers. Anchorage ARTCC Air Traffic Managers forward pertinent PIREPs and other volcanic information to the CWSU and/or AAWU.

AAWU/Tokyo VAAC: AAWU and JMA Tokyo use a multi-lingual telephone fax form to conduct two-way collaboration and sharing of information, including resulting text and graphics products, for possible and confirmed volcanic eruptions over the Kamchatka Peninsula and Northern Kuriles.

AAWU/Montreal VAAC (Canadian Meteorological Centre, Meteorological Services of Canada (MSC)): AAWU collaborates with the Montreal VAAC to run the Modele Lagrangien de Dispersion des Particules (MLDP0), the Montreal VAAC operational dispersion model, coordinate event details and products involving ash in the vicinity of Canadian airspace and the possible transfer of VAAC responsibility.

2.5.4 NWS Procedures

Notification of a potential volcanic ash hazard can be made by the AAWU (using satellite data, webcams, online seismic data, etc), the CWSU (PIREP, satellite data, webcams, online seismic data, etc.), WFOs (satellite, radar, spotter report, etc.), WSOs (spotter and/or PIREPs) and/or by AVO (seismic, satellite, etc.). Collaboration and information sharing phone calls and conversations are sometimes made simultaneously by the AAWU, CWSU, and AVO.

The following are the procedures following notification of a volcanic eruption.

2.5.4.1 AAWU Procedures

A. Once the AAWU has been notified of a potential volcanic ash hazard, the AAWU immediately contacts the CWSU (or the Watch Supervisor at Anchorage ARTCC if the CWSU is closed) and AVO to collaborate on the details of the eruption and/or to confirm an eruption occurred.

B. A collaboration call is made to the CWSU and AVO to discuss the possible ash height, volume, and trajectory of the eruption cloud and to ask the CWSU to solicit additional PIREPs.

C. A preliminary SIGMET is issued, if required, within 5 minutes of eruption notification, if possible.

D. Notify Alaska Region ROC for a Cook Inlet or any significant impact volcano across the State.

E. A request is sent, if required, for the SDM at NCEP to initiate and disseminate the HYSPLIT.

F. A second call is made to the CWSU to collaborate on products (i.e., VAA, follow-up SIGMET, and/or Graphical Volcanic Ash MIS) that will be issued, if required, by the CWSU and AAWU and the information that will be contained in those products.

G. Subsequent coordination is made with other partner organizations when the volcanic ash hazard is expected to impact or is impacting those partner areas of responsibility. Partner organizations include the Washington VAAC, Tokyo VAAC, Montreal VAAC, the AWC, and affected Alaska NWS offices.

H. Handoffs to partner VAACs and/or the ending of an event are preceded by a conference call with the CWSU, AVO, and any other principle units involved in the event (except Tokyo VAAC where handoffs are accomplished via the bi-lingual fax) to achieve a consensus on further actions.

2.5.4.2 CWSU Procedures

A. Once a report of a volcanic eruption or volcanic ash is forwarded to the CWSU (via PIREP, AVO, and/or AAWU collaboration call), the CWSU meteorologist enters the report as an UUA.

B. The UUA is disseminated to the Anchorage ARTCC Watch Supervisor, TMU, front line managers (FLMs), and controllers; preliminary information is shared; and PIREPs are solicited.

C. A phone call is made to the AAWU and AVO to collaborate on the possible ash cloud height, volume, and trajectory.

D. A second phone call is made to the AAWU to collaborate on products (i.e., VAA, follow-up SIGMET, and/or Graphical Volcanic Ash MIS) that will be issued, if required, by the CWSU and AAWU and the information that will be contained in those products.

E. Any SIGMETs pertaining to the eruption are copied and disseminated to the Anchorage ARTCC Watch Supervisor, Traffic Management Unit (TMU), Supervisors (SUPs), and controllers. Informal briefings, including additional information and clarification, are conducted at this time.

F. A Graphical Volcanic Ash MIS, if required, is prepared and faxed to the Anchorage ARTCC TMU defined list of customers.

G. A graphic of either the SIGMET or Graphical Volcanic Ash MIS is prepared and transmitted to the seven internal briefing terminals within the Anchorage ARTCC.

H. Follow-up briefings and collaboration calls and/or collaborative sessions on the Volcanic Ash Collaboration Tool (VACT) or other collaboration platforms take place as needed. Development of a Google Earth based collaboration software is currently underway and should replace the VACT in the near future.

2.5.4.3 Alaska Region ROC Procedures

A. During a Cook Inlet volcanic eruption, or any eruption expected to cause significant impacts across the State, the Alaska Region ROC (AR ROC) will be notified by the Anchorage VAAC and will spin up operations.

B. The AR ROC will monitor the NWSChat volcanochat chatroom and communicate via chat, phone with NWS field offices, and other partners as necessary.

C. AR ROC may lead teleconference calls periodically to facilitate collaboration and gain situational awareness of the event.

D. AR ROC will prepare "For The Record" (FTR) reports for NWS and NOAA senior leadership as required.

2.5.4.4 WFO and WSO Procedures

A. Once notified of an eruption that may produce ash fall on a populated area, including marine areas, the WFO collaborates with the AAWU who then calls AVO to collaborate on location and forecast movement of ash.

B. A collaboration call is made to AVO regarding potential ash fall rates, depth, and aerial coverage.

C. A collaboration call is made to the affected WSO(s), CWSU, and AAWU to share information and solicit spotter reports and PIREPS.

D. A collaboration call is made to the DHS&EM.

E. WFOs and WSOs may issue warnings and statements as public and marine products when volcanic ash is present or is expected to be present within their area of responsibility. Warnings and statements contain the spatial extent and progress of the ash. Warnings and statements should be consistent with the location of the ash as given in SIGMETs issued by AAWU or provided in the graphical volcanic ash MISs issued by the CWSU.

F. The WFO(s) and WSO(s) refer all public questions on the effects of ash fallout relating to public health and safety to the DHSS and DEC.

G. The WFO(s) and WSO(s) refer all public questions on the geological aspects of the eruption to the AVO in Anchorage.

H. Follow-up collaboration calls with the AVO, DHS&EM, AAWU, WSO(s), and CWSU are conducted as needed.

2.5.5 Volcanic Ash Data and Forecast Models

2.5.5.1 Reliable Reports for Volcanic Eruptions with Ash

Reliable reports of volcanic eruptions are critical for the timely notification and warning of any volcanic ash potentially affecting the Alaska FIR. Information from reliable sources outside of the Alaskan FIR also is valuable for inclusion in the VAAs, the Volcanic Ash SIGMETs, Volcanic Ash UJAs, Volcanic Ash fall forecasts, and Graphical MISs.

The NWS determination of the reliability of a report of an eruption accompanied by volcanic ash depends on the source of information and the location of that eruption. Every report of volcanic ash from an eruption is subject to confirmation.

- a. An eruption with ash is assumed to have occurred within the Alaskan FIR when reported by at least one of the following:
 - (1) Pilot report.
 - (2) Ground (land or water) observer.
 - (3) Information from AVO.
 - (4) Satellite or weather radar imagery.
 - (5) NWS operations staff.
 - (6) National Centers [Washington VAAC, the National Center for Environmental Prediction (NCEP), or the Aviation Weather Center (AWC)].

- b. An eruption with ash is assumed to have occurred for volcanoes outside of the Alaska FIR when reported by at least one of the following:
 - (1) Pilot Report.
 - (2) Japan Meteorological Agency (JMA).
 - (3) Environment Canada.
 - (4) CMC.
 - (5) KVERT or SVERT.
 - (6) VAACs.
 - (7) MWOs.

2.5.5.2 Ash Trajectory Forecasts and Numerical Computer Models Used in the Forecast Process

When a volcano with a high potential to impact the Alaskan FIR goes to color code **ORANGE**, the AAWU may request that NCEP produce automatic 3 hourly HYSPLIT model runs. In addition, AVO scientists at the Geophysical Institute in Fairbanks produce automatic Puff model runs available on their public website for every volcano in Alaska and Russia at color code **YELLOW** or higher. This provides much needed quick reference model runs for those critical minutes following notification of a significant or major eruption as defined below.

NWS Meteorological definitions of minor, significant, and major eruptions:

Minor Eruption = Estimated vertical extent ash is below 20,000 feet.

Significant Eruption = Estimated vertical extent ash extends to or above 20,000 feet up to 40,000 feet.

Major Eruption = Estimated vertical extent ash extends to or above 40,000 feet.

A. Puff Model

The AAWU should initiate the Puff trajectory model available on the local area network at the VAAC when a volcanic eruption is suspected or has occurred. The Puff is intended to provide guidance to forecasters for preparing the initial ash SIGMET and VAA. The Puff model also is useful for minor ash producing eruptions with the potential to affect airports within 40 nautical miles of the volcano. Output from Puff is not disseminated.

B. HYSPLIT

The primary eruption response ash tracking model is the NWS HYSPLIT model. The HYSPLIT is initiated by a request from the Anchorage VAAC. The VAAC should initiate the HYSPLIT for all significant or major eruptions affecting Alaska FIRs. Issuing the HYSPLIT for minor eruptions will be at the discretion of the AAWU senior forecaster based on coordination with the AVO and the NCEP NCO Senior Duty Meteorologist (SDM).

The HYSPLIT products from the request are used by the AAWU via web interface. The AAWU should initiate the HYSPLIT as quickly as possible to support AVO eruption response operations. This is critical for support of the AVO volcano hazards warning system and safety of personnel and instruments during monitoring operations once an eruption has begun.

There are two modes of HYSPLIT Alert products – the **Alert** mode and the **Watch** mode:

A. **Alert** - all **Significant** and **Major** eruptions. The **Alert** status should remain in effect until advised by AVO that the volcano in question is no longer erupting.

B. **Alert** - Seismically **unmonitored** volcanoes when any eruption occurs that contains **volcanic ash**. The continuation of an **Alert** will be based on coordination with volcanological authorities and the SDM at NCEP.

C. **Watch** - Seismically monitored volcanoes the volcanological authorities have listed as aviation color code **RED** that are **not erupting** should be issued at least **twice daily**.

D. **Watch** - All **seismically monitored** volcanoes listed with color code **ORANGE** the local volcanological authorities indicate could produce a significant or major eruption in the next 24–48 hours.

In the event HYSPLIT is not available, a request should be made by the AAWU lead forecaster for the MODELE LAGRANGIEN DE DISPERSION DES PARTICULES (MLDP0) through the CMC. The request is made by calling CMC in Montreal, Canada. Output from the MLDP0 is available via telephone, fax, or the Internet.

A request from the AAWU forecaster to the SDM at NCEP is required for dissemination of the HYSPLIT products to external customers. HYSPLIT products should be disseminated for significant and major eruptions to airlines operating in Alaska, DOD, USCG, and the FAA Flight Service Stations; and the World Area Forecast Service (WAFS) to government, national commercial, and international commercial customers.

2.5.6 Dissemination of Products

Meteorological information, products, and warnings from the NWS about volcanic ash are disseminated through operational communications systems, such as:

A. NWS's Telecommunications Gateway for Volcanic Ash Advisories, Volcanic Ash International SIGMETs, public, and marine text products.

B. FAA's Aeronautical Information System Replacement (AISR) via WMSCR for text CWAs, MISs, and PIREPs (routine and urgent).

C. NOAA Weather Wire for public and marine text products.

D. NOAA Weather Radio, which is the link to the Emergency Alert System, for public and marine text products.

E. NWS marine HF and VHF radios for marine text products.

F. The WAFS for HYSPLIT graphic products.

G. Internet Fax Service for the Graphical Volcanic Ash MIS.

These operational dissemination systems are reliable and maintenance is on call 24 hours a day, 7 days a week. Volcanic ash advisories, public and marine text/graphic products, HYSPLIT, MLDP0, satellite and radar imagery applicable to the eruption and volcanic ash also are available through the Internet and CoastWatch. The Internet and CoastWatch are not as reliable as the preceding operational systems because posting of the products could be disrupted without repair service outside of the regular business hours at night, on weekends, and on holidays. Information on the CoastWatch service can be provided by the CoastWatch Manager. The warnings and statements for the public also are disseminated by DHS&EM through the DHS&EM First Class e-mail system, the DHS&EM Daily Situation Update and the DHS&EM Website (<http://www.ak-prepared.com>). This network reaches the majority of the emergency services organizations in Alaska.

2.6 UNITED STATES COAST GUARD (USCG)

Coast Guard aviation assets fly missions on a routine basis throughout the State of Alaska. If during these missions, Coast Guard aircrews notice any suspected volcanic activity, they shall attempt to report that activity to the nearest FAA Flight Service Station.

During eruptions, the USCG may issue a Marine Information Broadcast to alert mariners of hazardous conditions related to volcanic activity. NWS will email Marine Weather Statements (WHAKF8 PAFC) and Special Marine Warnings (FZAK78 PAFC) related to a volcanic eruption and subsequent ash fall to the three USCG Command Centers in Alaska. Upon receipt of these weather statements and special marine warnings, the USCG will issue a Marine Information Broadcast for the impacted area(s). The USCG email addresses are:

District 17 Command Center – JRCCJuneau@uscg.mil

Sector Juneau Command Center – SCCJuneau@uscg.mil

Sector Anchorage Command Center – Sector.Anchorage@uscg.mil

2.7 DEPARTMENT OF ENVIRONMENTAL CONSERVATION (DEC)

2.7.1 DIVISION OF AIR QUALITY (DEC AQ)

Timely notification of explosive eruptions by AVO to the DEC AQ manager will initiate a call down by the DEC AQ manager to the MOA Air Quality manager (if ash fall is expected in Municipality of Anchorage) and the Alaska State Department of Health and Social Services (DHSS) to allow time for preemptive action if needed. Once an ash cloud is reported and the levels of ash due to ash cloud motion and fallout are expected to exceed the National Ambient Air Quality Standards (NAAQS) for particulates or monitoring data indicates that high levels of ash exist, DEC AQ will issue an air quality

advisory. The decision to issue the advisory is based on input from the NWS and AVO regarding the intensity and movement of the ash cloud. Advisories are often forecast in nature and will be adjusted once observations of ash or actual monitoring data are received. Standards are violated when the average concentration of ash greater than 10 microns in diameter (PM-10; considered inhalable) exceeds $150 \mu\text{g}/\text{m}^3$ for 24 hours. This is equivalent to an Air Quality Index (AQI) value of 100 (see table below). The air quality advisory will contain information concerning the predicted movement of the ash cloud, where ash is expected to fall, anticipated duration of poor air quality, and how bad the air quality is expected to become. The advisory also identifies steps the public can take to protect their health and the health of other sensitive individuals if they encounter ash fall. The following chart depicts air quality categories:

Table of PM-10 Particulate Levels and the Air Quality Index

Categories	Cautionary Statements	AQI
Good	None	0 - 50
Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion.	51 - 100
Unhealthy for Sensitive Individuals	People with respiratory or heart disease, the elderly and children should limit prolonged exertion.	101 - 150
Unhealthy	People with respiratory or heart disease, the elderly and children should avoid prolonged exertion; everyone else should limit prolonged exertion.	151 - 200
Very Unhealthy	People with respiratory or heart disease, the elderly and children should avoid outdoor activity; everyone else should avoid prolonged exertion.	201 - 300
Hazardous	Everyone should avoid outdoor exertion; people with respiratory or heart disease, the elderly and children should remain indoors.	301 - 500

Advisories will be posted to the State DEC AQ webpage at: <https://myalaska.state.ak.us/dec/air/airtoolsweb/Advisories.aspx>. On this webpage, there also are links to sign up for email and/or Twitter notification. Advisories will automatically be disseminated via email and Twitter to anyone who signs up. This includes individuals and local and State government agencies who request updates. During an ash fall event, the Alaska State Department of Health and Social Services

(DHSS) coordinates with Department of Environmental Conservation (DEC) to include appropriate health information and guidance in Public Service Announcements for the general public and special needs populations such as those with chronic respiratory conditions. People who experience respiratory difficulty during an ash fall event are advised to contact their local healthcare provider. After ash fallout, DHSS coordinates with DEC to assure that personnel performing recovery operations are aware of health risks and personal protection required during clean up.

Upon notification of increased seismic or volcanic activity in Alaska, the DEC Air Quality staff will evaluate the need for deploying particulate monitors to measure levels of airborne ash in the event of an eruption. Monitoring site location(s) will be selected based on the potential ash fall trajectory, ability to physically site a monitor, and the protection of public health. Additional consideration will be given to local emergency response needs, availability of onsite technical support, proximity to population centers and anticipated duration of the event. Other DEC programs will be contacted to provide technical assistance as needed. Near real time particulate data (i.e., hourly averages) are available for the State's population centers. The data and associated AQI can be viewed at <https://fortress.wa.gov/ecy/aaqm/Default.htm>

2.7.2 DIVISION OF ENVIRONMENTAL HEALTH, DRINKING WATER PROGRAM

2.7.2.1 Notification of Ash Producing Events

AVO will coordinate with the Alaska Department of Environmental Conservation (AK-DEC) Drinking Water Program during ash fall events by providing information on the expected distribution and timing of ash fall during eruptions in Alaska. This information also may be provided by NWS as part of their ash fall statements and advisory products. At their discretion, the AK-DEC Drinking Water Program staff will communicate with operators of public water systems (PWS) to inform them of possible or pending ash fall and discuss appropriate guidance for dealing with ash-impacted water (i.e., fill tanks before ash fall begins, etc.) and emergency response. During an ash fall event, the Alaska Department of Health and Social Services (AK-DHSS) coordinates with the AK-DEC to include appropriate health information and guidance in Public Service Announcements for the general public and special needs populations.

2.7.2.2 Ash Leachates

If ash leachates are expected to cause water quality to exceed national drinking water standards or monitoring data indicates that high levels of ash leachates exist, the AK-DEC Drinking Water Program will determine whether it is appropriate to issue a Drinking Water Advisory. Advisory statements are often forecasts in nature and will be adjusted once observations of ash leachates or actual monitoring data are received. Monitoring data may include water quality information from PWS operators or ash leachate analyses provided by AVO. The Drinking Water Program will determine whether the Environmental Protection Agency's (EPA) Maximum Contaminant Level (MCL) standards have been exceeded for a regulated contaminant following an ash-fall event.

The Drinking Water Program staff will independently work with operators of public water systems to determine the appropriate course of action to protect public health following a MCL exceedance. EPA drinking water standards can be found at this URL:

<http://water.epa.gov/drink/contaminants/index.cfm#List>.

Drinking Water Advisories or guidance statements will contain information concerning regulated contaminants and water quality parameters, such as pH value, sulfate levels, etc., in the ash-impacted water. The advisory also identifies steps the public can take to protect their health and the health of other sensitive individuals if they encounter ash in their water as well as information about what is being done by PWS operators and other officials to ensure good water quality.

3.0 Plan Management

This is the sixth edition of the Alaska Interagency Operating Plan for Volcanic Ash Episodes. The plan should be reviewed and updated every 2 years. The plan will be maintained by the National Weather Service Alaska Region (Environmental and Scientific Services Division) or other plan participant as needed.

Prior editions of the plan from 1994, 1997, 2001, 2004, and 2008 are on file at the Alaska Volcano Observatory in Anchorage.

4.0 List of Acronyms

AAWU	Alaska Aviation Weather Unit
ACC	Area Control Center
ADGGS	Alaska Division of Geological and Geophysical Surveys
AFB	Air Force Base
AFTN	Aeronautical Fixed Telecommunications Network
AFWA	Air Force Weather Agency
AISR	Aeronautical Information System Replacement
ALCOM	Alaskan Command
ANR	Alaska North American Aerospace Defense Command
AQ	Air Quality
AQI	Air Quality Index
ARTCC	Air Route Traffic Control Center
ATCSCC	Air Traffic Control System Command Center
AVO	Alaska Volcano Observatory
AWC	Aviation Weather Center
AWIPS	Advanced Weather Information Processing System
CANERM	Canadian Emergency Response Model
CIC	Controller in Charge
CMC	Canadian Meteorological Centre
CVO	Cascades Volcano Observatory
CWA	Center Weather Advisory
CWSU	Center Weather Service Unit
CWT	Combat Weather Team
DAWN	Digital Aviation Weather Network
DEC	Alaska Department of Environmental Conservation
DHS&EM	Division of Homeland Security and Emergency Management
DHSS	Alaska Department of Health and Social Services
DHHS	Anchorage Department of Health and Human Services
DMSP	Defense Meteorological Satellite Program
DOD	Department of Defense
EAS	Emergency Alert System
FAA	Federal Aviation Administration
FDC	Flight Data Center
FIR	Flight Information Region
FLM	Front Line Manager
FSS	Flight Service Station
FTP	File Transfer Protocol
GSC	Geological Survey of Canada
HF	High Frequency
HVO	Hawaiian Volcano Observatory
ICAO	International Civil Aviation Organization
IVS	Institute of Volcanology and Seismology
JBER	Joint Base Elmendorf-Richardson
JMA	Japan Meteorological Agency
JTF-AK	Joint Task Force Alaska

KBGS	Kamchatkan Branch of Geophysical Services
KVERT	Kamchatkan Volcanic Eruption Response Team
LVO	Long Valley California Volcano Observatory
METSAT	Meteorological Satellite
MIS	Meteorological Impact Statement
MLDPO	Modele Lagrangien de Dispersion des Particules
MSC	Meteorological Services of Canada
MWO	Meteorological Watch Office
NAAQS	National Ambient Air Quality Standards
NCEP	National Centers for Environmental Prediction
NOAA	National Oceanic and Atmospheric Administration
NOPAC	North PACific
NOTAM	NOTice to AirMen
NWR	NOAA Weather Radio
NWS	National Weather Service
OM	Operations Manager
168 ARW	168 th Air Refueling Wing
OSIC	Operational Supervisor-in-Charge
OSS	Operations Support Squadron
OSW	Operations Support Weather
OWS	Operational Weather Squadron
PIREP	Pilot Weather Report
PM-10	Particulate Matter, 10 microns and smaller
PWS	Public Water Supply
RAOC	Air Force Regional Air Operations Center
ROC	Regional Operations Center
SAB	Satellite Analysis Branch
SDM	Senior Duty Meteorologist
SECC	State Emergency Coordination Center
17 OWS	17 th Operational Weather Squadron
SIC	Scientist-In-Charge
SIGMET	SIGnificant METeorological Information
611 AOC/CODW	611 th Air Operations Center Weather Support Team
673 ABW/CP	673 rd Air Base Wing Command Post
SOC	Service Operations Center
SVERT	Sakhalin Volcanic Eruptions Response Team
TFR	Temporary Flight Restriction
3 WG/CP	3 rd Wing Command Center
354 FW/CP	354 th Fighter Wing Command Center
TMI	Traffic Management Initiative
TMO	Traffic Management Officer
TMU	Traffic Management Unit
UAFGI	University of Alaska Fairbanks Geophysical Institute
USARAK	United States Army Alaska
USCG	United States Coast Guard
USGS	United States Geological Survey
UUA	Urgent Pilot Report

VAAC	Volcanic Ash Advisory Center
VAA	Volcanic Ash Advisory
VACT	Volcanic Ash Collaboration Tool
VAFTAD	Volcanic Ash Forecast Transport and Dispersion
VAN	Volcanic Activity Notice
VONA	Volcano Observatory Notice for Aviation
VHF	Very High Frequency
WAFS	World Area Forecast Service
WARP	Weather and Radar Processor
WC	Weather Coordinator
WFO	Weather Forecast Office
WMSCR	Weather Message Switching Center Replacement
WS	Weather Squadron
WSO	Weather Service Office
YVO	Yellowstone Volcano Observatory
ZAN	Anchorage Air Route Traffic Control Center

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5.0 Principal Contacts and Agency Web Pages

ALASKA VOLCANO OBSERVATORY

<http://www.avo.alaska.edu/>
<http://volcanoes.usgs.gov/ash/>
<http://volcanoes.usgs.gov>

DIVISION OF HOMELAND SECURITY AND EMERGENCY MANAGEMENT

<http://www.ready.alaska.gov/>

FEDERAL AVIATION ADMINISTRATION

<http://www.faa.gov>
Alaskan Region: <http://www.alaska.faa.gov>

NATIONAL WEATHER SERVICE

Alaska Region: <http://www.arh.noaa.gov>
AAWU: <http://aawu.arh.noaa.gov>
CWSU: <http://cwsu.arh.noaa.gov>

UNITED STATES AIR FORCE

Air Force Weather Agency: <https://weather.afwa.af.mil>
(.mil or .gov domain sites only)

UNITED STATES COAST GUARD

<http://www.uscg.mil/d17/>

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Main Website: <http://www.dec.state.ak.us/index.htm>
Air Quality Advisories: http://www.dec.state.ak.us/air/am/aq_sr.htm
Volcanic Ash Info: <http://www.dec.state.ak.us/air/volcano.htm>

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***.0 Signature Page**

<u>1 August 2011</u> Date	<u>//Signed//</u> John W. Madden Director Division of Homeland Security and Emergency Management
<u>1 August 2011</u> Date	<u>//Signed//</u> John Power Scientist-in-Charge Alaska Volcano Observatory U.S. Geological Survey
<u>1 August 2011</u> Date	<u>//Signed//</u> Scott G. Magnan, Lt Col, USAF Staff Weather Officer Joint Base Elmendorf-Richardson
<u>1 August 2011</u> Date	<u>//Signed//</u> Robert N. Lewis Regional Administrator Federal Aviation Administration Alaskan Region
<u>1 August 2011</u> Date	<u>//Signed//</u> Frank P. Kelly Director National Weather Service Alaska Region
<u>1 August 2011</u> Date	<u>//Signed//</u> Daniel Travers, Captain, USCG Chief, Incident Response Branch (drm) Seventeenth Coast Guard District
<u>1 August 2011</u> Date	<u>//Signed//</u> Larry Hartig Commissioner Department of Environmental Conservation

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- APPENDIX A ACTIVE VOLCANOES OF ALASKA – LIST OF VOLCANOES, IAVCEI CATALOG NUMBER, LOCATION IN LATITUDE AND LONGITUDE, LAST HISTORICAL ERUPTION, ELEVATION IN FEET AND METERS
- APPENDIX B MAP OF ACTIVE VOLCANOES OF ALASKA
- APPENDIX C ACTIVE VOLCANOES OF KAMCHATKA AND THE NORTHERN KURILES – LIST OF VOLCANOES, IAVCEI CATALOG NUMBER, LOCATION IN LATITUDE AND LONGITUDE, LAST HISTORICAL ERUPTION, ELEVATION IN FEET AND METERS
- APPENDIX D MAP OF ACTIVE VOLCANOES OF KAMCHATKA
- APPENDIX E ACTIVE VOLCANOES OF THE KURILE ISLANDS – LIST OF VOLCANOES, IAVCEI CATALOG NUMBER, LOCATION IN LATITUDE AND LONGITUDE, LAST HISTORICAL ERUPTION, ELEVATION IN FEET AND METERS
- APPENDIX F MAP OF ACTIVE VOLCANOES OF THE KURILES
- APPENDIX G PUBLIC PHONE NUMBERS FOR VOLCANIC ASH EPISODES IN GREATER COOK INLET
- APPENDIX H PUBLIC WEB SITES FOR VOLCANIC ASH EPISODES IN GREATER COOK INLET
- APPENDIX I ASH FALL SEVERITY TERMS IN USE IN ALASKA
- APPENDIX J VOLCANO WARNING PRODUCTS IN USE IN ALASKA

Appendix A. Active Volcanoes of Alaska – List of Volcanoes, IAVCEI Catalog Number, Location in Latitude and Longitude, Last Historical Eruption, Elevation in Feet and Meters

MAP#	NAME	IAVCEI CATALOG#	LOCATION	LAST HISTORICAL ERUPTION	ELEVATION
1	Wrangell	1105-02	62°00'N, 144°01'W	1902	14,163'; 4,317 m
2	Spurr	1103-04	61°18'N, 152°15'W	1992	11,070'; 3,374 m
3	Redoubt	1103-03	61°28'N, 152°45'W	2009	10,197'; 3,108 m
4	Iliamna	1103-02	60°02'N, 153°06'W	**	10,016'; 3,053 m
5	Augustine	1103-01	59°23'N, 153°26'W	2005-2006	4,134'; 1,260 m
6	Douglas	1102-27	58°52'N, 153°32'W	**	7021'; 2,140 m
7	Fourpeaked	1102-26	58°46'N, 153°40'W	2006	6,903'; 2,104 m
8	Kukak	1102-23	58°27'N, 154°21'W	**	6,693'; 2,040 m
9	Snowy	1102-20	58°20'N, 154°41'W	**	7,090'; 2,161 m
10	Griggs	1102-19	58°21'N, 155°06'W	**	7,602'; 2,317 m
11	Katmai	1102-17	58°16'N, 154°59'W	1912	6,716'; 2,047 m
12	Novarupta	1102-18	58°16'N, 155°09'W	1912	2,759'; 841 m
13	Trident	1102-16	58°14'N, 155°07'W	1953-74	3,599'; 1,097 m
14	Mageik	1102-15	58°11'N, 155°14'W	**	7,103'; 2,165 m
15	Martin	1102-14	58°10'N, 155°21'W	**	6,102'; 1,860 m
16	Ugashik-Peulik	1102-13A	57°45'N, 156°21'W	1852?	4,836'; 1,474 m
17	Ukinrek	1102-13B	57°50'N, 156°30'W	1977	299'; 91 m
18	Chiginagak	1102-11	57°08'N, 157°00'W	1971?	7,005'; 2,135 m
19	Aniakchak	1102-09	56°53'N, 158°10'W	1931	4,400'; 1,341 m
20	Veniaminof	1102-07	56°10'N, 159°23'W	2002-2008	8,225'; 2,507 m
21	Kupreanof	1102-06	56°45'N, 159°47'W	**	6,217'; 1,895 m
22	Pavlof	1102-03	55°25'N, 161°54'W	2007	8,261'; 2,518 m
23	Emmons Lake Volcanic Center	1102-02	55°20'N, 162°04'W	**	4806'; 1,465 m
24	Dutton	1102-011	55°11'N, 162°16'W	**	4,833'; 1,473 m
25	Amak	1101-39	55°25'N, 163°09'W	**	1683'; 513 m
26	Shishaldin	1101-36	54°45'N, 163°58'W	2004	9,373'; 2,857 m
27	Fisher	1101-35	54°39'N, 164°26'W	1830?	3,648'; 1,112 m
28	Westdahl	1101-34	54°31'N, 164°39'W	1991-92	5,118'; 1,560 m
29	Gilbert	1101-33A	54°15'N, 165°40'W	**	2,684'; 818 m
30	Akutan	1101-32	54°08'N, 165°58'W	1992	4,275'; 1,303 m
31	Makushin	1101-31	53°53'N, 166°56'W	1995	6,680'; 2,036 m
32	Bogoslof	1101-30	53°56'N, 168°02'W	1992	492'; 150 m
33	Okmok	1101-29	53°24'N, 168°10'W	2008	3,520'; 1,073 m
34	Recheshnoi	1101-28	53°09'N, 168°32'W	**	6,509'; 1,984 m
35	Vsevidof	1101-27	53°08'N, 168°41'W	1957?	7,050'; 2,149 m
36	Kagamil	1101-26	52°58'N, 169°43'W	1929?	2,930'; 893 m
37	Carlisle	1101-23	52°54'N, 170°03'W	1987?	5,315'; 1,620 m
38	Cleveland	1101-24	52°49'N, 169°57'W	2010	5,676'; 1,730 m
39	Yunaska	1101-21	52°38'N, 170°38'W	1937	1,804'; 550 m
40	Amukta	1101-19	52°30'N, 171°15'W	1996	3,497'; 1,066 m
41	Seguam (Pyre Peak)	1101-18	52°19'N, 172°31'W	1993	3,458'; 1,054 m
42	Korovin (Atka Is.)	1101-16	52°23'N, 174°09'W	2006	5,029'; 1,533 m
43	Kliuchef (Atka Is.)	1101-16	52°20'N, 174°08'W	1995?	5,030'; 1,533 m
44	Kasatochi	1101-13	52°11'N, 175°30'W	2008	1,030'; 314 m
45	Great Sitkin	1101-12	52°05'N, 176°08'W	1974	5,709'; 1,740 m
46	Kanaga	1101-11	51°55'N, 177°10'W	1993-96	4,288'; 1,307 m
47	Tanaga	1101-08	51°53'N, 178°08'W	1914	5,925'; 1,806 m

Appendix A. Active Volcanoes of Alaska – List of Volcanoes, IAVCEI Catalog Number, Location in Latitude and Longitude, Last Historical Eruption, Elevation in Feet and Meters—Continued

48	Gareloi	1101-07	51°47'N, 178°48'W	1996?	3,458'; 1,573 m
49	Semisopochnoi (Cerberus)	1101-06	51°56'N, 179°35'E	1987	2,625'; 800 m
50	Little Sitkin	1101-05	51°57'N, 178°32'E	1900?	3,898'; 1,188 m
<i>51</i>	<i>Segula</i>	<i>1101-03</i>	<i>52°50'N, 178°08'E</i>	<i>**</i>	<i>3,783'; 1,153 m</i>
52	Kiska	1101-02	52°06'N, 177°36'E	1990	4,003'; 1,220 m

Bold: Volcanoes with functioning seismic monitoring networks as of July 2011. Little Sitkin and Semisopochnoi have networks but telemetry is unreliable and AVO does not consider these volcanoes seismically monitored.

***Italics: Volcanoes with no historical (AD 1760–present) eruptions but considered hazardous because of plausible historical eruptions, vigorous fumarolic activity, intense earthquake swarms, or volcanic deformation.*

Data sources: (1) Miller, T.P. and others., 1998, Catalog of the historically active volcanoes of Alaska; U.S. Geological Survey Open-File Report 98-582, 104 p; (2) Simkin, T., and Siebert, L., 1994, Volcanoes of the world, Tucson, Arizona, Geoscience Press, Inc., 349 p; (3) the on-line database of the Global Volcanism Program of the Smithsonian Institution (<http://www.volcano.si.edu/gvp/world/index.cfm>); (4) published and unpublished AVO reports and internal files; (5) AVO's web site and online database of volcanoes called GEODIVA. Some inconsistencies among data sources remain unresolved and this list may change slightly through time as new information becomes available.

Appendix B. Active Volcanoes of Alaska



Appendix C. Active Volcanoes of Kamchatka and the Northern Kuriles – List of Volcanoes, IAVCEI Catalog Number, Location in Latitude and Longitude, Last Historical Eruption, Elevation in Feet and Meters

MAP#	NAME	IAVCEI CATALOG#	LOCATION	LAST HISTORICAL ERUPTION	ELEVATION
NORTH					
1	Sheveluch	1000-27	56°39'N, 161°21'E	1980-2011 active lava dome	10,768'; 3,283 m ~8,200 ft; ~2,500 m
2	Klyuchevskoy	1000-26	56°03'N, 160°39'E	2010	15,584'; 4,750 m
3	Ushkovsky	1000-261	56°04'N, 160°29'E	1890	12,933'; 3,943 m
4	Bezymianny	1000-25	55°58'N, 160°36'E	2011	9,498'; 2,895 m
5	Plosky Tolbachik	1000-24#	55°49'N, 160°24'E	1975-76	10,121'; 3,085 m
6	New Tolbachik	1000-24*	55°30'N, 160°12'E	1975-76	2,886'; 880 m
7	<i>Ichinsky</i>	<i>1000-28</i>	<i>55°40'N, 157°43'E</i>	**	<i>11,877'; 3,621 m</i>
CENTRAL					
8	Kizimen	1000-23	55°12'N, 160°19'E	2010-2011	8,151'; 2,485 m
9	<i>Gamchen</i>	<i>1000-21</i>	<i>54°58'N, 160°42'E</i>	**	<i>8,449'; 2,576 m</i>
10	<i>Komarov</i>	<i>1000-22</i>	<i>55°04'N, 160°43'E</i>	**	<i>6,790'; 2,070 m</i>
11	Kronotsky	1000-20	54°45'N, 160°30'E	1922-23	11,572'; 3,528 m
12	<i>Krashennnikov</i>	<i>1000-19</i>	<i>54°35'N, 160°16'E</i>	**	<i>6,088'; 1,856 m</i>
13	<i>Kikhpinych</i>	<i>1000-18</i>	<i>54°29'N, 160°14'E</i>	**	<i>5,091'; 1,552 m</i>
14	Uzon	1000-17	54°30'N, 159°55'E	1986	5,303'; 1,617 m
15	Bolshoi Semiachik	1000-15	54°19'N, 160°01'E	1953?	5,642'; 1,720 m
16	Maly Semiachik	1000-14	54°08'N, 159°40'E	1952	5,117'; 1,560 m
17	Karymsky	1000-13	54°03'N, 159°27'E	1996-2011	4,874'; 1,486 m
18	<i>Dzenzursky</i>	<i>1000-11</i>	<i>53°37'N, 159°00'E</i>	**	<i>7,497'; 2,285 m</i>
19	Zhupanovsky	1000-12	53°35'N, 159°08'E	1959	9,702'; 2,958 m
20	Koryaksky	1000-09	53°19'N, 158°41'E	2008-2009	11,336'; 3,456 m
21	Avachinsky	1000-10	53°15'N, 158°51'E	1991	8,890'; 2,751 m
SOUTH					
22	Opala	1000-08	52°32'N, 157°20'E	1894	8,118'; 2,475 m
23	Gorely	1000-07	52°33'N, 158°02'E	1984-1986	6,000'; 1,829 m
24	Mutnovsky	1000-06	52°27'N, 158°12'E	1960-61	7,621'; 2,323 m
25	Ksudach	1000-05	51°49'N, 157°32'E	1907	3,539'; 1,079 m
26	Zheltofsky	1000-04	51°35'N, 157°20'E	1923	6,406'; 1,953 m
27	Iliyinsky	1000-03	51°30'N, 157°12'E	1901	5,176'; 1,578 m
28	Koshelev	1000-02	51°21'N, 156°45'E	1690?	5,943'; 1,812 m
29	<i>Kambalny</i>	<i>1000-01</i>	<i>51°18'N, 156°54'E</i>	**	<i>7,072'; 2,156 m</i>
Other potentially active volcanoes of Kamchatka					
30	<i>Khodutka</i>	<i>1000-053</i>	<i>52°04'N, 157°42'E</i>	**	<i>6,855'; 2,090 m</i>
31	<i>Kurile Lake</i>	<i>1000-022</i>	<i>51°28'N, 157°06'E</i>	**	<i>400'; 122 m</i>
32	<i>Khangar</i>	<i>1000-272</i>	<i>54°45'N, 157°22'E</i>	**	<i>6,560'; 2,000 m</i>
SECTION ATLASOVA AND PARAMUSHIR ISLANDS (Northern Kuriles)					
33	Alaid	0900-39	50°52'N, 155°34'E	1986	7,674'; 2,339 m
34	Ebeko	0900-38	50°41'N, 156°01'E	2009	3,793'; 1,156 m
35	Chikurachki	0900-36	50°19'N, 155°28'E	2008	5,958'; 1,816 m
36	Fuss Peak	0900-34	50°16'N, 155°15'E	1854	5,814'; 1,772 m
37	Karpinsky Group	0900-35	50°08'N, 155°22'E	1952	4,413'; 1,345 m

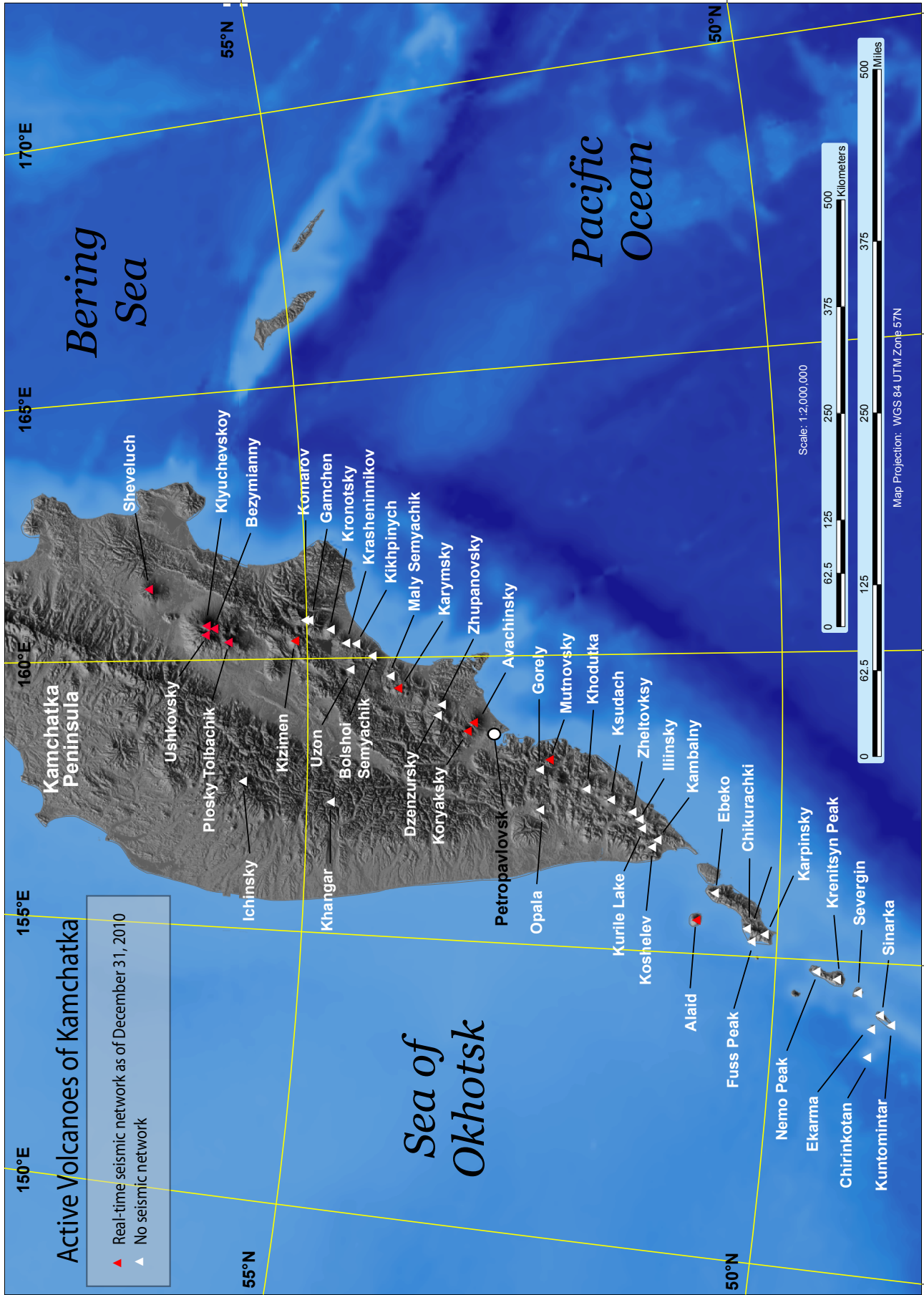
Bold: Seismically monitored volcanoes as of July 2011.

Italics: Last eruption date unknown or highly uncertain.

Data sources: (1) Simkin, T., and Siebert, L., 1994, Volcanoes of the world, Tucson, Arizona, Geoscience Press, Inc., 349 p; (2) the on-line database of the Global Volcanism Program of the Smithsonian Institution (<http://www.volcano.si.edu/gvp/world/index.cfm>); (3) Active Volcanoes of Kamchatka, S.A. Fedotov and Yu. P. Masurenkov, (eds.), Moscow Nauka Publishers (Moscow), vols. 1, 2; (4) KVERT information and other published and unpublished AVO reports and internal files. Some inconsistencies among data sources remain unresolved.

The Volcanoes of the World Catalog lists Tolbachik as one entry with a single number; New Tolbachik refers to vents as far as 28 km from the summit of Plosky Tolbachik.

Appendix D. Map of Active Volcanoes of Kamchatka



Appendix E. Active Volcanoes of the Kurile Islands – List of Volcanoes, IAVCEI Catalog Number, Location in Latitude and Longitude, Last Historical Eruption, Elevation in Feet and Meters

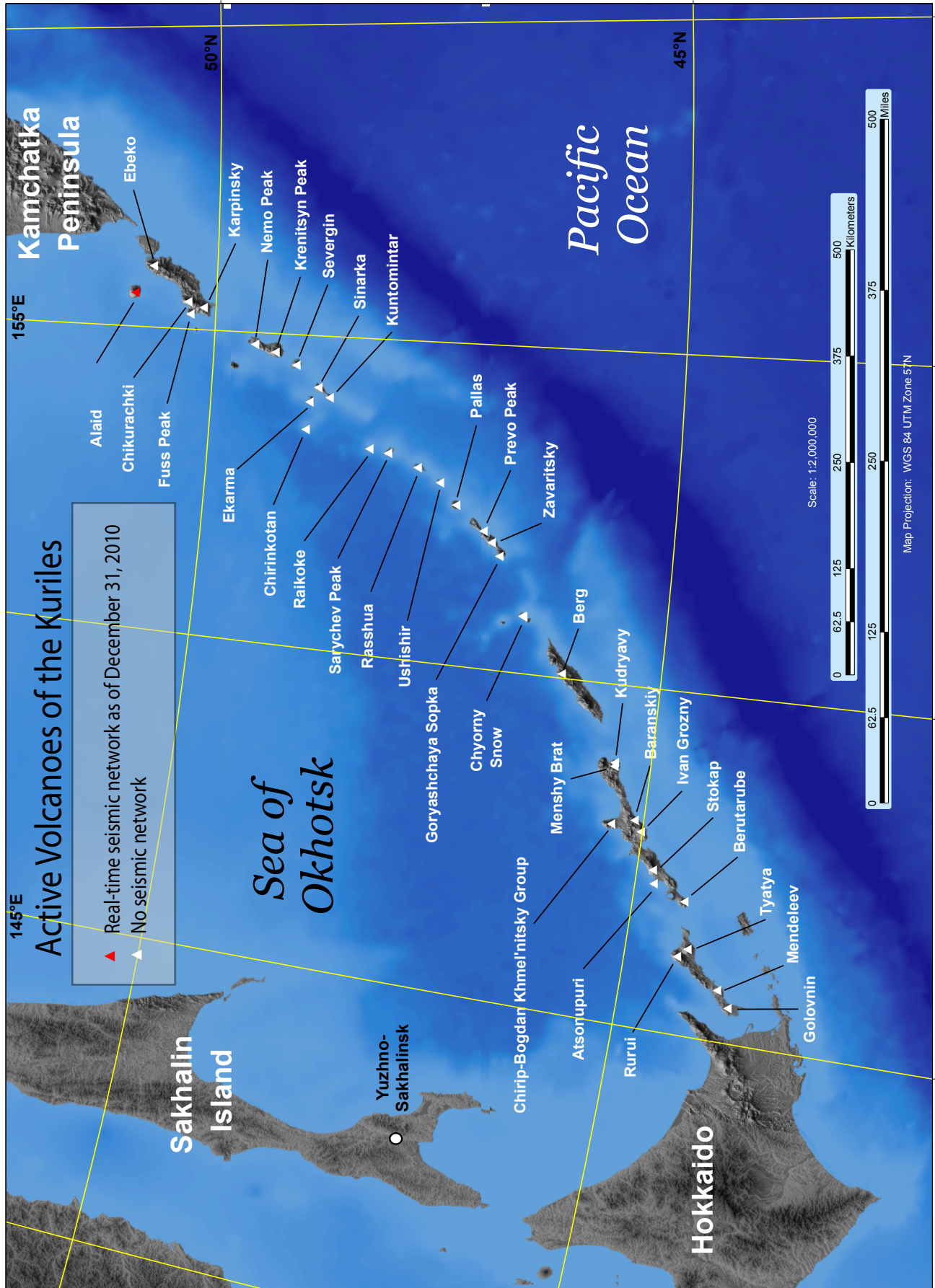
MAP#	NAME	IAVCEI CATALOG#	LOCATION	LAST HISTORICAL ERUPTION	ELEVATION
NORTHERN KURILES (1-13 are also shown on Kamchatka Map, Appendix D)					
1	Alaid (Atlasova Is.)	0900-39	50°52'N, 155°34'E	1986	7,674'; 2,339 m
2	Ebeko (Paramushir Is.)	0900-38	50°41'N, 156°01'E	2009	3,793'; 1,156 m
3	Chikurachki (Paramushir Is.)	0900-36	50°19'N, 155°28'E	2008	5,959'; 1,816 m
4	<i>Tatarinova (Paramushir Is.)</i>	--	<i>50°18'N, 155°27'E</i>	**	<i>5,020'; 1,530 m</i>
5	Fuss Peak (Paramushir Is.)	0900-34	50°16'N, 155°15'E	1854	5,814'; 1,772 m
6	Karpinsky Group (Paramushir Is.)	0900-35	50°08'N, 155°22'E	1952	4,413'; 1,345 m
7	Nemo Peak (Onkotan Is.)	0900-32	49°34'N, 154°48'E	1938	3,342'; 1,019 m
8	Krenitzyn Peak (Tao-Rusyr Caldera; Onkotan Is.)	0900-31	49°21'N, 154°42'E	1952	4,344'; 1,324 m
9	Severgin (Harimkotan Is.)	0900-30	49°07'N, 154°30'E	2007?	3,796'; 1,157 m
10	Sinarka (Shiashkotan Is.)	0900-29	48°52'N, 154°11'E	2003?	3,064'; 934 m
11	Kuntomintar (Shiashkotan Is.)	0900-28	48°45'N, 154°01'E	1924	2,717'; 828 m
12	Ekarma (Ekarma Is.)	0900-27	48°57'N, 153°56'E	2010	3,842'; 1,171 m
13	Chirinkotan (Chirinkotan Is.)	0900-26	48°59'N, 153°28'E	2004	2,375'; 724 m
CENTRAL KURILES					
14	Raikoke (Raikoke Is.)	0900-25	48°17'N, 153°15'E	1924	1,808'; 551 m
15	Sarychev Peak (Matua Is.)	0900-24	48°06'N, 153°12'E	2009	4,744'; 1,446 m
16	Rasshua (Rasshua Is.)	0900-22	47°45'N, 153°01'E	1957?	3,113'; 949 m
17	<i>Ushishir (Yankich Is.)</i>	<i>0900-21</i>	<i>47°31'N, 152°48'E</i>	**	<i>1,276'; 389 m</i>
18	Ketoi (Pallas Peak; Ketoi Is.)	0900-20	47°20'N, 152°29'E	1960	3,248'; 990 m
19	Prevo Peak (Simushur Is.)	0900-19	47°01'N, 152°07'E	1914	4,462'; 1,360 m
20	Zavaritzii (Simushur Is.)	0900-18	46°55'N, 151°57'E	1957	2,050'; 625 m
21	Goryachaya sopka (Simushur Is.)	0900-17B	46°50'N, 151°45'E	1944?	2,923'; 891 m
SOUTHERN KURILES					
22	Cherny (Chirpoi Is.)	0900-15	46°31'N, 150°52'E	1857	2,047'; 624 m
23	Snow (Chirpoi Is.)	0900-15	46°31'N, 150°52'E	1982	1,296'; 395 m
24	Berga (Kolokol Group, Urup Is.)	0900-12	46°03'N, 150°04'E	2007?	3,215'; 980 m
25	Kudryavy (Medvezhii; Iturup Is.)	0900-10	45°23'N, 148°50'E	1999	3,235'; 986 m
26	<i>Men'shiy Brat (Iturup Is.)</i>	<i>0900-10</i>	<i>45°23'N, 148°47'E</i>	<i>~400 yrs BP</i>	<i>1,847'; 563 m</i>
27	Chirip cluster (Bogdan Khmelnitzky; Iturup Is.)	0900-09	45°23'N, 147°55'E	1860?	5,131'; 1,564 m
28	Baransky (Iturup Is.)	0900-08	45°06'N, 148°01'E	1951	3,717'; 1,133 m
29	Ivan Grozny (Iturup Is.)	0900-07	45°01'N, 147°52'E	1989	3,802'; 1,159 m
30	<i>Stokap (Iturup Is.)</i>	--	<i>44°50'N, 147°20'E</i>	**	<i>5,361'; 1,634 m</i>
31	Atsonupuri (Iturup Is.)	0900-05	44°48'N, 147°08'E	1932	3,953'; 1,205 m
32	<i>Berutarube (Iturup Is.)</i>	<i>0900-04</i>	<i>44°27'N, 146°56'E</i>	<i>1812</i>	<i>4,003'; 1,220 m</i>
33	<i>Ruruy (Kunashir Is.)</i>	<i>0900-032</i>	<i>44°27'N, 146°08'E</i>	**	<i>4,872'; 1,485 m</i>
34	Tyatya (Kunashir Is.)	0900-03	44°27'N, 146°15'E	1973	5,968'; 1,819 m
35	Mendeleev (Kunashir Is.)	0900-02	43°59'N, 145°44'E	1977	2,910'; 887 m
36	<i>Golovnin (Kunashir Is.)</i>	<i>0900-01</i>	<i>43°51'N, 145°30'E</i>	<i>~1900 yrs BP</i>	<i>1,775'; 541 m</i>

Bold: Seismically monitored volcanoes as of July 2011.

**** Italics: Last eruption date unknown or highly uncertain. These volcanoes often display thermal/fumarolic activity at the surface.**

Data sources: (1) Alexander Rybin and Marina Chibasova, IMGG (working from Russian maps at scales of 1:50,000 and 1:200,000), (2) Simkin, T., and Siebert, L., 1994, Volcanoes of the world, Tucson, Arizona, Geoscience Press, Inc., 349 p; (3) the on-line database of the Global Volcanism Program of the Smithsonian Institution (<http://www.volcano.si.edu/gvp/world/index.cfm>). Some inconsistencies between sources remain unresolved. This list and details will change as new geological information becomes available.

Appendix F. Map of Active Volcanoes of the Kuriles



APPENDIX G. PUBLIC Phone Numbers for Volcanic Ash Episodes in Greater Cook InletGENERAL PREPAREDNESS

Alaska Homeland Security and Emergency Management
(907) 428-7000 or 1-800-478-2337

VOLCANO / VOLCANIC ACTIVITY INFORMATION

Alaska Volcano Observatory (AVO)
(907) 786-7497
AVO Recording on the Status of Alaska's Volcanoes
(907) 786-7478

ASHFALL WARNINGS, MARINE ADVISORIES and SIGMETS (NOAA/NWS)

SIGMETS Alaska Aviation Weather Unit Lead Desk
(907) 266-5110
Ash fall and Marine Advisories
(907) 266-5105 use Option 1 for recorded info,
use Option 4 to speak with a forecaster
Alaska Weather Information Line
(907) 266-5145 or 1-800-472-0391

FLIGHT RESTRICTIONS (FAA)

Anchorage Air Route Traffic Control Center Watch Desk
(907) 269-1103

MARINE SAFETY

USCG
Command Center District 17 Search and Rescue
or related topics
1-800-478-5555 or (907) 463-2000
Coast Guard Sector Anchorage (Kodiak, Cook Inlet,
Prince William Sound)
(907) 271-6700

HEALTH – ASH IMPACTS

Alaska Department of Health and Social Services:
Section of Epidemiology
Public Health Emergencies
(907) 269-8000 or (800) 478-0084 after hours

AIR QUALITY MONITORING

Alaska Department of Environmental Conservation -
Division of Air Quality
(907) 269-7676
Municipality of Anchorage Air Quality Hotline
(907) 343-4899

LAND MANAGER

Alaska Department of Natural Resources
(907) 269-8566
Alaska Region NPS Public Relations (Anchorage)
(907) 644-3513 and (907) 644-3512
Katmai National Park and Preserve (King Salmon)
(907) 246-3305
Lake Clark National Park and Preserve (Homer)
(907) 235-7903

LOCAL BOROUGH/MUNICIPALITIES

Bristol Bay Borough
(907) 246-4224
Lake and Peninsula Borough
(907) 246-3421 and 800-764-3421
Kenai Peninsula Borough Office of Emergency
Management
(OEM) (907) 262-4910
Kodiak Borough Manager's Office
(907) 486-9300 use Option 1 for Manager's Office
Anchorage Office of Emergency Management
(907) 343-1401

APPENDIX H. PUBLIC web sites for Volcanic Ash Episodes in Greater Cook InletGENERAL PREPAREDNESS

Alaska Department of Homeland Security and Emergency Management
<http://www.ready.alaska.gov/>

VOLCANIC ACTIVITY INFORMATION

Alaska Volcano Observatory (AVO) <http://www.avo.alaska.edu/>

ASHFALL WARNINGS, MARINE ADVISORIES and SIGMETS (NOAA/NWS)

Ash fall and Marine Advisories <http://pafc.arh.noaa.gov/>
SIGMET, AIRMET <http://aawu.arh.noaa.gov/>
HYSPLIT wind trajectories http://www.arl.noaa.gov/ready/traj_alaska.html
NWS RADAR <http://www.arh.noaa.gov/radar.php>
Anchorage Volcanic Ash Advisory Center <http://vaac.arh.noaa.gov>

TSUNAMI WARNINGS

West Coast Alaska Tsunami Warning Center <http://wcatwc.arh.noaa.gov/>

FLIGHT RESTRICTIONS (FAA)

TFRs <http://tfr.faa.gov/tfr2/list.jsp>
NOTAMS <https://www.notams.faa.gov/>

MARINE SAFETY

US Coast Guard District 17 Search and Rescue <http://www.uscg.mil/d17/>
US Coast Guard Alaska Public Affairs <http://www.uscgalaska.com>

HEALTH – ASH IMPACTS

Alaska Department of Health and Human Services; Volcano Information
<http://www.epi.hss.state.ak.us/volcanoes/default.htm>

AIR QUALITY MONITORING

Alaska Department of Environmental Conservation - Division of Air Quality <https://myalaska.state.ak.us/dec/air/airtoolsweb/Advisories.aspx>

LAND MANAGERS

Alaska Department of Natural Resources <http://www.dggs.dnr.state.ak.us/>
Katmai National Park and Preserve <http://www.nps.gov/katm/>
Lake Clark National Park and Preserve <http://www.nps.gov/lac/>

LOCAL BOROUGHS/MUNICIPALITIES

Bristol Bay Borough <http://www.theborough.com/>
Lake and Peninsula Borough <http://www.lakeandpen.com/>
Kenai Peninsula Borough <http://www.borough.kenai.ak.us/emergency/>
Kodiak Borough <http://www.kodiakak.us/>
Municipality of Anchorage <http://www.muni.org/departments/oem/pages/default.aspx>

Appendix I. Ash fall severity terms in use in Alaska as of 2011. Official text products from NWS and other agencies, attempt to utilize consistent terminology when describing ash fall events and amounts.

TERM	APPROXIMATE ACCUMULATION	NWS MESSAGE	KEY IMPACTS (cumulative with increasing ash)	RECOMMENDATIONS (cumulative with increasing ash)
Trace or Dusting	< 1/32 in 0.031 in < 0.8 mm	Special Weather Statement Marine Weather Statement	Eye and respiratory irritant. Very low-level impacts for most people.	Avoid excessive exposure to ash, especially those with respiratory sensitivities. Protect critical electronics and other equipment from contamination.
Minor	1/32 - 1/4 in 0.031 - 0.25 in 0.8 - 6.4 mm	Ash Fall Advisory Marine Weather Statement	Possible harm to crops, animals; minor equipment and infrastructure damage. Reduced visibility. Widespread clean-up may be necessary.	Seal windows and doors. Protect electronics and cover air intakes and open water supplies. Minimize driving. Listen to your radio station for further information.
Substantial	1/4 - 1 in 0.25 - 1 in 6.4 - 25.4 mm	Ash Fall Warning Special Marine Warning	Disruption of services and utilities (water, sewer, electric) possible. Ash removal efforts significant.	Seal windows and doors. Protect electronics and cover air intakes. Avoid driving. Listen to your radio station for further information.
Heavy	1 - 4 in 25.4 - 100 mm	Ash Fall Warning Special Marine Warning	Weaker roofs and structures can fail at ~4-5 inches of wet ash (~40 lbs/square ft). Crop damage. Livestock loss. Services, utilities interrupted.	Remain indoors unless absolutely necessary. Use extreme caution clearing rooftops of ash. Avoid driving. Listen to your radio station for further information.
Severe	> 4 in > 100 mm	Ash Fall Warning Special Marine Warning	Significant danger of roof collapse; heavy damage to trees and crops. Essential services severely disrupted. Heavy animal loss. Roads unusable.	Remain indoors unless absolutely necessary. Use extreme caution clearing rooftops pf ash. Avoid driving. Listen to your radio station for further information.

Appendix J. Official volcano warning products in Alaska, 2011.

[Primary warning agencies in Alaska involved in volcanic eruption hazard communication and the names of public warning products for events in south central Alaska. Some messages are very specific in their intended audience (e.g. Notices to Airmen [NOTAMs] and Urgent Pilot Reports [UUA]) and others are of broader use (e.g. Ashfall Advisories, Air Quality Advisories, and Information Releases). Significant redundancy is inherent in this system and proactive coordination is necessary to ensure that messages are consistent. UUAAs can be issued by either FAA or NWS personnel. Not all messages will be issued for every eruption or episode of volcanic unrest]

Alaska Volcano Observatory (AVO)	National Weather Service (NWS)	Federal Aviation Administration (FAA)	Alaska Department of Homeland Security and Emergency Management (DSHEM)	U.S. Coast Guard (USCG)	Alaska Department of Environmental Conservation, Division of Air Quality (DEC)	Alaska Department of Environmental Conservation, Drinking Water Program (DEC)	Alaska Department of Public Health (DPH)	Municipality of Anchorage (MOA)
Information Release	SIGMET (Significant Meteorologic Information)	NOTAM (Notice to Airmen)	SITREP (Situation Report)	Notice to Mariners	Air Quality Advisory	Drinking Water Advisory or guidance statements	Public Service Announcement	Air Quality Advisory
Weekly Report	VAA (Volcanic Ash Advisory)	UUA (Urgent Pilot Report)	Community Alert					
Daily Status Report	MIS (Meteorologic Impact Statement)							
(VAN) Volcanic Activity Notice	CWA (Center Weather Advisory)							
(VONA) Volcano Observatory Notice for Aviation	Ashfall Advisory, Warning							
	Marine Advisory							
	Special Weather or Marine Statements							