



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Anchorage Air Route Traffic Control Center

ZAN
ORDER
1900.2H

Effective Date:
January 3, 2011

SUBJ: EMERGENCY PLAN FOR VOLCANIC ERUPTIONS AFFECTING ALASKAN AIRSPACE

1. **PURPOSE:** This order revises procedures established by ZAN Order 1900.2G, Emergency Plan for Volcanic Eruptions Affecting Alaskan Airspace. This order establishes the notification procedures in the event of increased volcanic activity.
2. **DISTRIBUTION:** This order is distributed to the Air Traffic Manager's Library, Watch Desk Library and ZAN-540.
3. **CANCELLATION:** This order cancels ZAN Order 1900.2G, effective February 15, 2010.
4. **EFFECTIVE DATE:** January 3, 2011.
5. **BACKGROUND:** Volcanic eruptions and subsequent ash drift/fallout have caused delays and damage to aircraft and equipment. There is a continuing possibility of further eruptions, particularly in the Cook Inlet and Aleutian Chain areas of Alaska, and the Kamchatka Peninsula and Kurile Islands of the Russian Far East. Notification of activity could be received from several sources, which include the Alaska Volcano Observatory (AVO), the Regional Operations Center (ROC), the Regional Air Operations Center (RAOC), the Anchorage Volcanic Ash Advisory Center (VAAC), the Tokyo VAAC, the Kamchatkan Volcanic Eruption Response Team (KVERT), Sakhalin Volcanic Eruption Response Team (SVERT), airline operators, pilot report, other FAA facilities, or the general public.
6. **RESPONSIBILITIES:** Upon receiving notification of an eruption or possible eruption:
 - a. The Watch Supervisor must:
 - (1) Verify the occurrence of volcanic activity with the AVO at (907) 786-7497. Additional contact numbers can be found in Appendix E of this document and the Alaska Interagency Plan for Volcanic Ash Episodes.
 - (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 (See Appendix A, Example 1), and notify personnel and facilities listed in 6.a.(2).(a). If the aviation color code has been elevated to "orange" or "red" notify personnel and facilities listed in 6.a.(2).(b) of this order 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 (See Appendix A, Example 1), and notify personnel and facilities listed in 6.a.(2)(a) of this order.

(2) If a volcanic eruption is verified by the AVO, the Watch Supervisor must take the following action:

(a) All volcanoes, notify:

- The Center Weather Service Unit (CWSU) Meteorologist who will issue an Urgent Pilot Report (UUA). (See Appendix B.) If an eruption occurs when the CWSU meteorologist is not on duty, the WC must issue the UUA, contact the Alaskan Aviation Weather Unit (AAWU) and if required, contact a CWSU Meteorologist to report immediately to Anchorage Air Route Traffic Control Center (ARTCC).
- 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) In accordance with 14 CFR Section 91.137(a) (1), and after coordination with Western Service Center (see JO 7210.3V ZAN SUP 2), issue an FDC Flight Restriction NOTAM (TFR) if it is determined that the volcanic event could endanger airborne aircraft and occupants. (See Appendix A, Example 2).

(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. (See Appendix A, Example 3). (See Appendix C for AVO Alert Levels).

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

b. FLM/CIC must:

(1) Ensure that Pilot Reports (PIREPs) are solicited by controllers and recorded on a PIREP form.

NOTE: Pilots may forward PIREPs regarding volcanic activity using the format described in the Volcanic Activity Reporting Form (VAR), see Appendix D.

(2) Disseminate NOTAM, PIREP, TFR, MIS, SIGMET and current conditions information to controllers on duty.

c. Traffic Management Unit must:

(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 must:

(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.

7. APPENDICES:

- a. Appendix A: Volcano NOTAM Examples
- b. Appendix B: Urgent Pilot Report Example
- c. Appendix C: Aviation Color Code and Ground-Based Hazard Charts
- d. Appendix D: Volcanic Activity Reporting Form (VAR)
- e. Appendix E: AVO Points of Contact and Web Addresses



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Air Traffic Manager

APPENDIX A

VOLCANO NOTAM EXAMPLES

Templates are located on the share drive at: S:\ZAN_AT\OPSSHARE\VOLCANO NOTAMS

EXAMPLE 1: Increased Volcanic Activity NOTAM

PLEASE ISSUE THIS INTERNATIONAL NOTAM WITH THE FOLLOWING TEXT (INCLUDE AVIATION COLOR CODE IF EITHER "ORANGE" OR "RED"):

_____/____ ZAN FI/T /ZAN/ VOLCANIC ACTIVITY ADVISORY FOR _____ name _____
VOLCANO AK/ _____ (latitude and longitude of volcano) _____ /ALASKA VOLCANO OBSERVATORY
HAS REPORTED INCREASED VOLCANIC ACTIVITY IN THE VICINITY OF _____ name _____
VOLCANO WHICH INDICATES THE POSSIBILITY OF A VOLCANIC ERUPTION. (AVIATION
ALERT COLOR CODE _____ (orange/red) _____ IS IN EFFECT). AIRCRAFT SHOULD REMAIN ALERT
FOR POSSIBLE ERUPTION, STEAM OR ASH CLOUDS AND REPORT ANY SIGHTINGS TO ATC
IMMEDIATELY. CONTACT ANCHORAGE ARTCC AT 907-269-1103 FOR ADDITIONAL
INFORMATION.

EXAMPLE 2: FDC Flight Restrictions NOTAM

PLEASE ISSUE THE FOLLOWING TEMPORARY FLIGHT RESTRICTION (TFR):

FDC ___ / _____ ZAN AK. FLIGHT RESTRICTIONS _____ (name) _____ VOLCANO, AK.
EFFECTIVE IMMEDIATELY UNTIL FURTHER NOTICE. PURSUANT TO 14 CFR SECTION
91.137 (A) (1). TEMPORARY FLIGHT RESTRICTIONS ARE IN EFFECT FROM SURFACE TO
_____ (affected altitude) _____ WITHIN _____ (number of nautical miles) _____ NAUTICAL MILE RADIUS OF
_____ (fix/radial distance or latitude/longitude) _____. PILOTS ARE ADVISED TO EXERCISE EXTREME
CAUTION WHEN OPERATING NEAR THIS RESTRICTED AREA PARTICULARLY WHILE
DOWNWIND FROM THE VOLCANO. CHECK CURRENT CWA, SIGMET AND PIREP
INFORMATION. ANCHORAGE /ZAN/ ARTCC 907-269-1103 IS THE FAA COORDINATION
FACILITY. WIE UNTIL UFN.

EXAMPLE 3: Volcanic Ash Advisory NOTAM

This type of NOTAM should be issued, including the aviation color code, when advised the volcano status has been upgraded to "ORANGE" or "RED" and ash may be present. If a "RED volcano is subsequently downgraded to "ORANGE" but ash may be present, the NOTAM should be modified to reflect the change in color code. This NOTAM should be cancelled when the volcano is further downgraded to "YELLOW" or "GREEN," or when ash is no longer expected to be present. If the volcano remains restless and no ash emissions are present or expected, issue the NOTAM shown in Appendix A, Example 1.

A0294/07 - VOLCANIC ADVISORY FOR KLYUCHEVSKOY VOLCANO, KAMCHATKAN PENINSULA, RUSSIA, 5603N16039E. EFFECTIVE IMMEDIATELY UNTIL FURTHER NOTICE. KLYUCHEVSKOY VOLCANO HAS BEEN IN AN ACTIVE STATE. HAZARDOUS EMISSIONS OF VOLCANIC ASH HAVE INTERMITTENTLY COMPLICATED AIR TRAVEL IN THE AREA. ANY IMPACT ON AIRCRAFT OPERATIONS IS DESCRIBED IN CURRENT SIGMET, CWA OR PIREP INFORMATION. AIRCRAFT SHOULD REMAIN ALERT FOR POSSIBLE ASH CLOUDS AND REPORT ANY SIGHTINGS TO ATC. AIRCRAFT OPERATORS SHOULD CONTINUALLY EVALUATE OPERATION IN THE SIGMET AREA. AVIATION ALERT COLOR CODE (ORANGE/RED) IS IN EFFECT. FLIGHT INTO VOLCANIC ASH MAY CAUSE ENGINE DAMAGE/FAILURE AND ABRASION DAMAGE TO AIRFRAME AND WINDSHIELD SURFACES. ANY AIR CARRIERS, INCLUDING FOREIGN AIR CARRIERS THAT OBSERVE OR EXPERIENCE ANY DIFFICULTIES RESULTING FROM AN ENCOUNTER WITH VOLCANIC ASH, PLEASE NOTIFY ATC IMMEDIATELY IN ACCORDANCE WITH FAR 121.561 AND ICAO, ANNEX 3, PARAGRAPH 5.5 (SPECIAL AIRCRAFT OPERATIONS), AND ANNEX 6 PARAGRAPH 4.4.3 (HAZARDOUS FLIGHT CONDITIONS). CONTACT ANCHORAGE ARTCC, 907-269-1103 FOR ADDITIONAL INFORMATION. WIE UNTIL UFN.

APPENDIX B**FORMAT FOR VOLCANO URGENT PIREP (UUA) WHEN CWSU IS NOT STAFFED**

If a pilot report is received on a volcanic eruption and the presence of ash is suspected or confirmed, prepare an Urgent PIREP (UUA) in the following format:

UUA/OV _____ (CDB or ANC) _____ /TM _____ (time in four digits UTC) _____ /FL _____ (in three digits or UNKN) _____ /RM AN ERUPTION OF _____ (name of volcano) _____ OCCURRED AT _____ UTC.
EXTENT OF PLUME IS NOT IMMEDIATELY KNOWN. A CWA OR SIGMET WILL BE ISSUED WHEN MORE INFORMATION BECOMES AVAILABLE. (ZAN)

For ease of PIREP input and dissemination, use the following location identifiers when recording volcanic activity:

ANC - for all volcanoes in Cook Inlet and Southeast Alaska.

CDB - for all volcanoes in Western Alaska, the Aleutian Chain, Kamchatka Peninsula and the Kurile Islands.

APPENDIX C

**ALASKA VOLCANO OBSERVATORY
AVIATION COLOR CODES**

To more concisely describe the level of concern about possible or ongoing eruptive activity from an Alaskan volcano, the Alaska Volcano Observatory (AVO) uses the following color-coded classification system. Definitions of the colors reflect AVO's interpretations of the behavior of the volcano. Definitions are listed below, followed by general descriptions of the typical activity associated with each color.

Aviation Color Code Used by USGS Volcano Observatories	
Color codes, which are in accordance with recommended International Civil Aviation Organization (ICAO) procedures, are intended to inform the aviation sector about a volcano's status and are issued in conjunction with an Alert Level. Notifications are issued for both increasing and decreasing volcanic activity and are accompanied by text with details (as known) about the nature of the unrest or eruption, especially in regard to ash-plume information and likely outcomes.	
Color	Description
GREEN	Volcano is in typical background, noneruptive state <i>or, after a change from a higher level,</i> volcanic activity has ceased and volcano has returned to noneruptive background state.
YELLOW	Volcano is exhibiting signs of elevated unrest above known background level <i>or, after a change from a higher level,</i> volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
ORANGE	Volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain, OR eruption is underway with no or minor volcanic-ash emissions (ash-plume height specified, if possible).
RED	Eruption is imminent with significant emission of volcanic ash into the atmosphere (likely) OR eruption is underway or suspected with significant emission of volcanic ash into the atmosphere (ash-plume height specified, if possible).

**ALASKA VOLCANO OBSERVATORY
VOLCANIC ALERT LEVELS FOR GROUND-BASED HAZARDS**

Volcano Alert Levels Used by USGS Volcano Observatories	
Alert Levels are intended to inform people on the ground about a volcano's status and are issued in conjunction with the Aviation Color Code. Notifications are issued for both increasing and decreasing volcanic activity and are accompanied by text with details (as known) about the nature of the unrest or eruption and about potential or current hazards and likely outcomes.	
Term	Description
NORMAL	Volcano is in typical background, noneruptive state <i>or, after a change from a higher level,</i> volcanic activity has ceased and volcano has returned to noneruptive background state.
ADVISORY	Volcano is exhibiting signs of elevated unrest above known background level <i>or, after a change from a higher level,</i> volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
WATCH	Volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain, OR eruption is underway but poses limited hazards.
WARNING	Hazardous eruption is imminent, underway, or suspected.

APPENDIX D

VOLCANIC ACTIVITY REPORTING FORM (VAR)

Date _____

SECTION 1 - Transmit to ATC via radio

1. Aircraft Identification	
2. Position	
3. Time (UTC)	
4. Flight level or altitude	
5. Position/location of volcanic activity or ash cloud	
6. Air temperature	
7. Wind	
8. Supplementary Information (Brief description of activity including vertical and lateral extent of the ash cloud, horizontal movement, rate of growth, etc., as available).	

Mark the appropriate box(es).

SECTION 2 - Complete and forward

9. Density of ash cloud	<input type="checkbox"/> wispy	<input type="checkbox"/> moderately dense	<input type="checkbox"/> very dense
10. Color of plume or cloud	<input type="checkbox"/> white <input type="checkbox"/> black	<input type="checkbox"/> light gray	<input type="checkbox"/> dark gray
11. Eruption	<input type="checkbox"/> continuous	<input type="checkbox"/> intermittent	<input type="checkbox"/> not visible
12. Position of activity	<input type="checkbox"/> summit <input type="checkbox"/> multiple	<input type="checkbox"/> side <input type="checkbox"/> not observed	<input type="checkbox"/> single
13. Other observed features of eruption	<input type="checkbox"/> lightning <input type="checkbox"/> ash fallout	<input type="checkbox"/> glow <input type="checkbox"/> mushroom cloud	<input type="checkbox"/> large rocks <input type="checkbox"/> none
14. Effect on aircraft	<input type="checkbox"/> communications <input type="checkbox"/> pilot static <input type="checkbox"/> windows	<input type="checkbox"/> navigation systems <input type="checkbox"/> windscreen <input type="checkbox"/> none	<input type="checkbox"/> engines <input type="checkbox"/> other
15. Other effects	<input type="checkbox"/> turbulence <input type="checkbox"/> ash deposits	<input type="checkbox"/> St. Elmo's Fire	<input type="checkbox"/> fumes
16. Other information deemed useful			

Forward completed form via mail to:
 Global Volcanism Program
 NHB-119
 Smithsonian Institution
 Washington, DC 20560

Fax to:
 Global Volcanism Program
 (202) 357-2476

APPENDIX E
AVO POINTS OF CONTACT AND WEB ADDRESSES

AVO PRINCIPLE CONTACTS AND PHONE NUMBERS:

24 Hour Access:	907-786-7497
AVO Duty Scientist:	907-632-2275
AVO Scientist-In-Charge	907-632-2276

VOLCANO INFORMATION WEBSITES:

SIGMET/AIRMET Information:	http://aawu.arh.noaa.gov/
NOTAM Information:	https://www.notams.faa.gov
PIREP Information:	http://aawu.arh.noaa.gov/pireps/webPirep.htm
Anchorage VAAC:	http://aawu.arh.noaa.gov/vaac.php
Alaska Volcano Observatory:	http://www.avo.alaska.edu/
Ash Fall and Marine Advisories:	http://cwsu.arh.noaa.gov/
HYSPLIT Trajectories: (Alaska Volcanoes)	http://ready.arl.noaa.gov/READY_traj_alaska.php
Temporary Flight Restrictions:	http://tfr.faa.gov/tfr2/list.jsp
PUFF Model:	http://pafc.arh.noaa.gov/puffweb2/puffweb.php
KVERT (Current Volcanic Activity):	http://www.kscnet.ru/ivs/kvert/current/index_eng.php
NOAA Satellite & Information Service: (Split Window Loops/Kamchatka)	http://www.ssd.noaa.gov/VAAC/BEZY/SPLT/sploop.html
NOAA Satellite & Information Service: (Split Window Loops/Aleutians)	http://www.ssd.noaa.gov/VAAC/ALEUT/SPLIT/splitloop.html
NOAA Satellite & Information Service: (Aleutian Islands Volcano Watch)	http://www.ssd.noaa.gov/VAAC/aleut.html
NOAA Satellite & Information Service: (Kamchatka Volcano Watch)	http://www.ssd.noaa.gov/VAAC/kamchatka.html
Volcanic Ash Transport & Dispersion: (VAFTAD)	http://www.arl.noaa.gov/ready/ash.html
Tokyo VAAC	http://ds.data.jma.go.jp/svd/vaac/data/index.html