

County of Humboldt

VOLCANO ASH CONTINGENCY PLAN

TO THE

EMERGENCY OPERATIONS PLAN



HUMBOLDT OPERATIONAL AREA

Humboldt County Sheriff's Office
Office of Emergency Services
826 Fourth Street

Humboldt County Emergency Operations Plan
VOLCANO ASH CONTINGENCY PLAN

Eureka, CA 95501
2014

Adopted 15 July

VOLCANO ASH CONTINGENCY PLAN

1 TABLE OF CONTENTS

CONTENTS

1 Table of Contents

GENERAL INFORMATION

2 Foreword

- 2.1 Plan Scope and Purpose
- 2.2 Plan Authority and Activation
- 2.3 Plan Priority Use and Organization
- 2.4 Public Access to Plan
- 2.5 Humboldt County Map

3 Situation

- 3.1 Volcano Vulnerability
- 3.2 Volcano Ash
- 3.3 Likelihood of Volcano Ash Fall Event Occurrence
- 3.4 Volcanic Ash Potential Impacts
- 3.5 Human Health Impacts
- 3.6 Critical Infrastructure Impacts
 - 3.6.1 Buildings
 - 3.6.2 Telecommunications
 - 3.6.6 Power Facilities
 - 3.6.4 Transportation Systems
 - 3.6.5 Drinking Water
 - 3.6.6 Waste Water
- 3.7 Agriculture and Forestry Impacts

4 Preparations

- 4.1 Local Volcano Ash Fall Event Mitigation and Response Planning
- 4.2 Pre-Emergency Preparedness
- 4.3 Ongoing Volcano Monitoring Activities
- 4.4 USGS Volcano Event Notification Systems
- 4.5 Public Alerting and Warning Systems
- 4.6 Public Information Access

RESPONSE OPERATIONS

5 Concept of Operations

- 5.1 Emergency Response Objectives
- 5.2 Pre-Emergency Preparations
- 5.3 Emergency – Contingency Plan Activation
- 5.4 Agency Responsibilities During Ash Fall Operations
 - 5.4.1 Humboldt County Departments
 - 5.4.2 Local Government Fire, Law, EMS
 - 5.4.3 Other Local Government Entities
 - 5.4.4 Other Non-Governmental Organizations
 - 5.4.5 State Government Entities
 - 5.4.6 Federal Government Entities

Humboldt County Emergency Operations Plan
VOLCANO ASH CONTINGENCY PLAN

- 5.5 Radio Communications Shared Channels
- 5.6 Telephone Emergency Notification System (TENS) Activation
- 5.7 Post-Emergency Operations

- 6 Notification Procedures
- 7 Evacuation Procedures
- 8 Search and Rescue Procedures
- 9 Damage Assessment Procedures
- 10 Post-Volcano Ash Event Actions

SUPPLEMENTS

- 11 Reference Links
- 12 Acronyms
- 13 Glossary
- 14 Volcano Ash Contingency Plan Adoption

GENERAL INFORMATION

2 FOREWORD

2.1 Plan Scope and Purpose

The Volcano Ash Contingency Plan primarily addresses the Humboldt Operational Area's planned response to a volcano ash situation affecting Humboldt County. This Plan establishes detailed procedures for response to areas that have been or may be jeopardized by potential volcano ash fall. The purpose of this Plan is to minimize the loss of life and property through an organized notification and evacuation process and to provide for re-entry into areas that may have been evacuated and/or damaged.

2.2 Plan Authority and Activation

This Plan will be used in conjunction with, and under the authority of, the County of Humboldt Emergency Operations Plan. The Volcano Ash Contingency Plan will be implemented upon the decision of the Director of Emergency Services (Humboldt County Sheriff) or the Director's designated representative when a volcano event has occurred and ash fall is projected to impact Humboldt County. The Director will authorize at least a Level 2 activation of the Emergency Operations Center. Level 2 means the Incident Commander, the Command Staff, the Section Chiefs, and those other Branches and Units and Agency Representatives as are appropriate for the immediate situation. The Humboldt County Sheriff's Office of Emergency Services will ensure the Plan is current and will advise the Director on response procedures. The County of Humboldt's Volcano Ash Contingency Plan was adopted by the Humboldt County Board of Supervisors on 15 July 2014 (see Section 14).

2.3 Plan Priority Use and Organization

The most important operational information in this Volcano Ash Contingency Plan is contained in Section 5, RESPONSE OPERATIONS, which details specific volcano ash mitigation-related actions to be undertaken by County departments and by allied Operational Area agencies during a recognized volcano ash event. **The RESPONSE OPERATIONS section should be immediately consulted at the onset of a volcano ash event.**

The Plan's Section 3, SITUATION, provides interesting and useful information pertaining to the volcano ash issue in Humboldt County. Projected vulnerabilities and impacts are discussed.

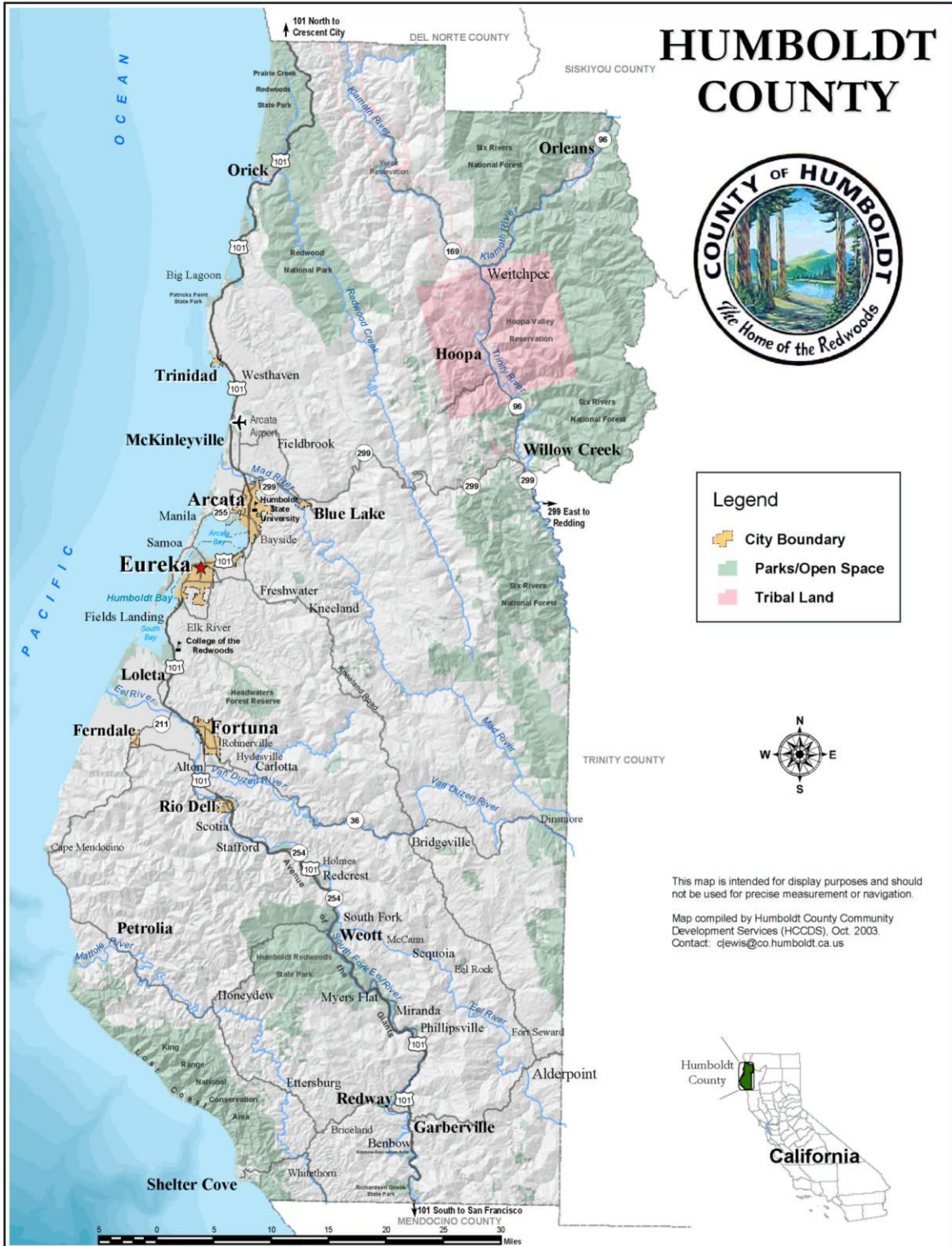
Section 4 of the Plan, PREPARATIONS, details normal ongoing planning and organization in support of probable future volcano ash operations actions. Mitigation measures, volcano ash-related notification/information pathways, alerting systems, and volcano ash-specific issues are reviewed.

2.4 Public Access to Plan

As a public document, this Plan, the County Emergency Operations Plan, and other specific event contingency plans are accessible via the Humboldt County internet web site (www.co.humboldt.ca.us/sheriff/).

2.5 Humboldt County Map

Humboldt County Emergency Operations Plan
VOLCANO ASH CONTINGENCY PLAN



3 SITUATION

3.1 Volcano Vulnerability

The national report on volcanic threat published by the United States Geological Survey (USGS) in 2005 (USGS Open-File Report 2055-1164 and 2011 update) lists eight young and potentially dangerous volcanic areas in California. Seven other young volcanic centers in California are also listed in the report but are ranked at a much lower threat level. Further, close proximity to a number of active or potentially active volcanoes to the north in Oregon and Washington could cause volcanic ash fall hazards in California depending on weather patterns and atmospheric affects.

The nearest likely volcanic hazard source locations to Humboldt County are to the East at Mount Shasta and Mount Lassen. Mount Shasta is approximately 65 miles from Humboldt County's eastern border (115 miles from Eureka), and Mount Lassen is approximately 110 miles from the eastern border (145 miles from Eureka). The other closest volcanic hazard source is to the Southeast at Mount Konocti near Clear Lake in Lake County which is approximately 85 miles from the County's southern border (145 miles from Eureka). Those volcanoes give rise to numerous geologic, hydrologic, and atmospheric hazards which can be highly destructive and life threatening. The hazards include volcanic ash, volcanic gases, lava flows and domes, high-speed avalanches and surges, volcanic mudflows, and eruption-related floods. However, those hazards are generally localized and have the greatest impacts close to the source of the volcanic eruption. The only direct volcanic hazard which could affect Humboldt County is volcanic ash.



Nearby volcano eruption history:

Mt. Shasta: The record of eruptions over the past 10,000 years suggests that, on average, at least one eruption occurs every 600 to 800 years. The most recent eruption event occurred 200 to 300 years ago.

Mt. Lassen: Activity over the past 100,000 years suggests that, within any given year, there exists about a 1 in 1,000 chance of an eruption. The last eruption event was 1914-1917.

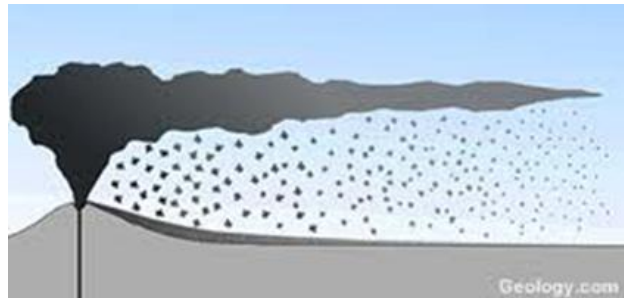
Mt. Konocti: The last eruption event occurred approximately 11,000 years ago.

3.2 Volcanic Ash

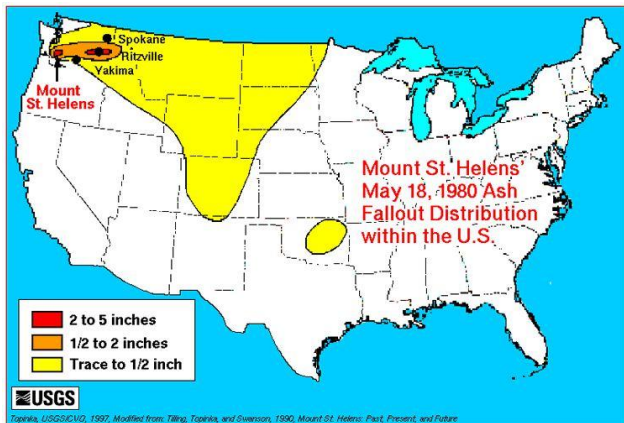
Volcanic ash columns and clouds occur when an explosive eruption blasts solid and molten rock fragments and volcanic gases into the air with tremendous force. The smallest fragments, having the coarseness of sand or flour and called volcanic ash or tephra, rise high into the air forming an eruption column. Vertical ash columns jet upwards rapidly from the eruption source and can reach more than 12 miles above a volcano in less than 30 minutes. Both vertical ash columns and more disperse clouds of drifting volcanic ash are a serious hazard to aviation. Eruption clouds have the greatest potential reach of impact and can extend hundreds of miles downwind, resulting in ash raining down over enormous areas, with the wind carrying the smallest ash particles the farthest. Heavy ash fall can occur great distances from the volcano source and can collapse buildings. Even minor ash fall can damage crops, electronics, and machinery. The volcanic ash hazard has the potential to cause significant problems for Humboldt County residents.

3.3 Likelihood of Volcanic Ash Fall Event Occurrence

Several factors have significant influence on the likelihood of an ash fall event impacting Humboldt County. First, a volcanic eruption must occur. This is a very rare event at each site on the order of hundreds to thousands of years between eruptions. But, with multiple volcanic sites capable of producing ash fall, an impact event could occur within living memory (the most recent significant event was in 1980 at Mt. St. Helens in Washington state). The eruption source location distance from Humboldt County and the severity of the eruption both have a direct correlation to the potential for ash fall impacts here. Lastly, the wind direction must be such that ash is deposited in Humboldt County.



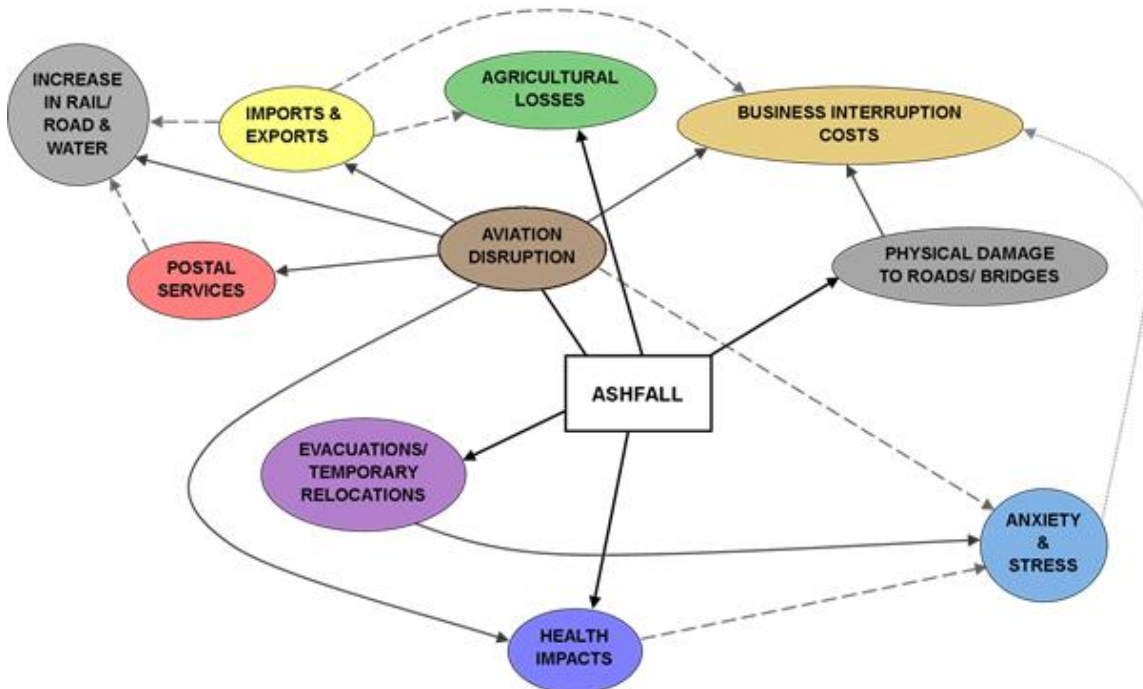
With the primary volcano source locations being to the East and to the Southeast with other source locations much farther to the North in Oregon and Washington, sustained winds from those directions must occur to bring significant amounts of ash to Humboldt County. In all likelihood, an eruption event would result in an ash fall pattern similar to that from Mt. St. Helens. Since the predominant wind direction for Humboldt County is an on-shore flow from the ocean, winds would tend to



push ash fall away from Humboldt County. The likelihood of sustained winds occurring from the East is very low – on the order of less than 10% at any given time. So, a volcanic ash fall occurrence in Humboldt County would be a very rare event.

3.4 Volcanic Ash Potential Impacts

The finest volcanic ash can create hazards hundreds of miles away from the source. As is illustrated in the below diagram, fine ash fall can have widespread, significant impacts on human health and interactions, trade, critical infrastructure and operations, and agriculture. Significant immediate response, mitigation, and recovery efforts can be implemented and result in long-term detrimental impacts over a wide area. Some of those impacts are detailed in the following passages. Much more detailed information on the impact, mitigation, and clean-up of volcanic ash can be



found at the following USGS web site:

<http://volcanoes.usgs.gov/ash/index.html>.

3.5 Human Health Impacts

People exposed to volcanic ash fall and subsequent ash-filled air commonly experience various eye, nose, and throat symptoms. Short-term exposures, however, are not known to pose a significant health hazard. Long-term health effects of volcanic ash have not yet been demonstrated conclusively.

Medical services can expect an increased number of patients with respiratory and eye symptoms during and after ash fall. People will generally be very concerned about the effects of ash, and questions usually arise about the content of the ash – particularly regarding crystalline silica (quartz), which is known to cause silicosis, a disabling and potential fatal lung disease typically found in miners and quarry workers. Exposure to respirable-sized crystalline silica from most ash falls is typically of short duration (days to weeks), and medical data suggests that for the general population, the recommended respirable exposure limit of 50 micrograms/m³ of air can be exceeded for short periods without a long-term ill health effect.

The basis mitigation strategy is to avoid unnecessary exposure to airborne ash. Preventive measures include wearing high-efficiency dust masks, and protecting home and offices from ash infiltration. If no approved mask is available, a fabric mask improvised from handkerchiefs, cloth, or clothing will filter-out the larger ash particles, which may contribute to throat and eye irritation. Patients with chronic bronchitis, emphysema, and asthma are advised to stay inside and avoid unnecessary exposure to ash.

3.6 Critical Infrastructure Impacts

Critical infrastructure is always adversely impacted by an area-wide event such as a volcano eruption. Fortunately, the coastal area where we live can only be affected by volcanic ash fall and not by the many other hazards present in an eruption. However, those ash fall impacts to infrastructure in Humboldt County can be significant and wide-spread.

3.6.1 Buildings

Damage to buildings can range from roof collapse to minor abrasion to exterior surfaces. The severity and nature of the impact depend on several factors including the thickness of ash, whether it is wet or dry, the roof and building design, air-handling systems, and how much ash penetrates the inside of the building.

In a general way, the effect of ash loads on building roofs is similar to that of wet snow loading with the caveat that, as a similar thickness, ash loads are likely to be 5-10 times greater. The structural impact varies greatly depending on roof slope, construction materials, roof span and support system, and the age and maintenance of the building. Flat roofs are generally more susceptible to collapse than steeply pitched roofs, and roofs made of smooth materials like sheet metal and glass are more likely to shed volcanic ash than roofs made of rough materials like asphalt or wood shingles. Because gutters and drains are designed to collect water from roofs, they are perfect “ash traps” and one of the most susceptible parts of a building.

The abrasive and mildly corrosive nature of ash can damage mechanical, electrical, and electronic systems. Air-handling systems and air conditioners are particularly vulnerable to ash damage, especially if the air intakes are horizontal surfaces. A few key steps undertaken before ash fall begins can significantly reduce damage. Systems should be shut down, air intakes protected, doors and windows closed, and plastic taped over electronics and metal surfaces (example: security system displays, swipe card and door locks, alarms, electrical panels, computers).

After an ash fall, removing ash from the roofs of buildings is usually a top priority in order to prevent roof collapse and reactivate the ventilating and air-handling systems. All openings into the building (doors, windows, air intakes) should be closed and sealed before removing ash from roofs. Removal methods vary, but, the main aim is to remove ash and cart it away with as little as possible remobilization of the ash back into the atmosphere.

Removal of ash from electrical and mechanical equipment should be done avoiding damage by rubbing or brushing. Portable vacuum systems equipped with high-efficiency particulate filtering systems are recommended whenever possible.

3.6.2 Telecommunications

The most serious problems to telecommunications systems result from the conductive and abrasive properties of ash. Radio, TV, and telephone communications are extremely vulnerable to disruption during a volcanic ash fall and may become temporarily inoperable. Disruptions include attenuation and reduction of broadcast signals, overloading of telephone systems due to increased user demand, and direct damage to communications facilities including collapse of transmission lines, antennas, satellite dishes, and towers due to ash loading.

Most modern telephone exchanges require air-cooling systems to keep electronic switching gear below critical temperatures. Exchanges with external air-cooling systems are thus vulnerable to over-heating if these units fail or are switched-off – even if the exchange is sealed. Ash entering telephone exchanges can cause

abrasion, corrosion, or conductivity damage to electrical and mechanical systems.

Preventive measures include replacing Teflon insulators with ceramic insulators to prevent shorting, replacing easily abraded plastic switches with push buttons, sealing repeater stations and air intakes, and installing covers on the equipment (for example, a plastic tarp).

Ash should be removed from communications systems by blowing out and vacuuming out radio equipment, sealing equipment that is not already watertight, and keeping moisture out of equipment. Magnetic particles that stick to relay cores should be blown off.

3.6.3 Power Facilities

Volcanic ash fall can quickly lead to the loss of electricity for a widespread area affecting people, businesses, and critical systems. Power-generating facilities may shut down during heavy ash fall and may not start again until ash has been removed from the facility, air-intake systems, and insulators. The most common problems are line breakage occurring when ash-laden tree limbs fall on distribution lines and supply outages resulting from insulator flashover (unintended electrical discharge). Weather conditions strongly affect the extent to which flashover is a problem. Flashover typically occurs when ash is very fine (easily adhering to lines and substation insulators) and wet (becoming highly conductive).

To prevent widespread power outages, ash should be removed from electrical supply facilities as soon as possible. The washing of insulators should start from the bottom up to minimize the chance of wet, reworked ash forming a sufficient cover to induce flashover. If possible, de-ionized water should be used. Suggested methods for the protection of electrical supplies include dusting, sweeping, and blowing ash from electrical equipment immediately after an ash fall and shutting down all electrical systems (by throwing the main circuit breakers) before any attempt is made to clean or service them. Maintain protection and cleaning programs continuously until the threat of windblown ash is over.

3.6.4 Transportation Systems

Ash fall may severely disrupt transportation systems over extremely large areas for hours to days including roads and vehicles, airports and aircraft, and railways.

Visibility on roads is typically poor during and after an ash fall with vehicle headlights and brake lights ineffective and barely visible to other drivers. Fast-moving vehicles will stir-up ash along roads which further reduces visibility. Wet ash can cause roads to be slippery, and the braking ability of vehicles may be significantly reduced. Ash deposits thicker than about 1/50th of an inch will obscure or completely cover markings on roads that identify lanes, road shoulders, and direction of travel.

Ash can infiltrate nearly every opening and abrade or scratch most surfaces – especially between moving parts of vehicles. Ash particles easily clog air-filtration systems which can lead to overheating and engine failure. Seals on hydraulic components may wear out faster than usual, and brakes and brake assemblies are especially vulnerable to abrasion and clogging from ash.

Rail transportation is less vulnerable to volcanic ash than roads and highways with disruptions mainly caused by poor visibility and breathing problems for train crews. Light rain on fallen ash may also lead to short-circuiting of signal equipment.

Ash falling on airports will affect runways, taxiways, buildings, ground services, electrical utilities, communications facilities, and parked aircraft. Also, electronically activated badges used to gain entry to restricted areas may not permit access during power disruptions or if the badges become severely abraded by ash. Difficult landing conditions can exist due to reduced runway friction coefficient, and loss of local visibility when ash on the ground is disturbed by engine exhausts during take-off and landing. The deposition of ash on hangars and parked aircraft may add considerable weight and potentially damage their structural integrity.

Life-threatening and costly damages can occur to aircraft that fly through an eruption cloud. Based on reported damages from ash encounters, the hazard posed to aircraft may extend up to 3,200 miles from an erupting volcano. The actual effects of ash on aircraft depend on several factors including the concentration of volcanic ash and gas aerosols in the cloud, the length of time the aircraft actually spends in the cloud, and the actions taken by the pilots while in the eruption cloud.

Ash particles have the hardness of a pocket-knife blade and, upon impact with aircraft travelling at speeds of several hundreds of knots, cause abrasion damage to forward-facing surfaces including windscreens, fuselage surfaces, and compressor fan blades. The overall result of an aircraft's flying into an ash cloud can be degraded engine performance (including flame out), loss of visibility, and failure of critical navigational and operational instruments.

The threshold concentration at which ash poses no harm to aircraft is not known. It is usually assumed that ash identifiable on satellite images continues to present a hazard to aircraft.

Returning transportation systems to normal service following an ash fall requires the removal and disposal of ash and the cleaning of vehicles, aircraft, and facilities. Sprinkle ash with water and use motorized grades to blade it onto shoulders or into the ditches. Collect, load, and transfer the ash to trucks to be hauled to approved disposal sites.

Strategies for reducing the effects of ash to vehicles involve frequent oil changes, cleaning or replacing air filters often, using air pressure (<30 lbs/in²) to blow ash from electrical equipment and other

essential engine components (examples: alternator, starter, wiper motor, radiator, ...), and frequently cleaning vehicles with water to wash away the ash.

For aircraft, each of the major airframe and engine manufacturers has developed operational and maintenance related procedures for dealing with volcanic ash. These may be found in the appropriate Flight Crew Operating Manuals and Aircraft Maintenance Manuals.

3.6.5 Drinking water

Newly fallen volcanic ash may result in short-term physical and chemical changes in water quality, increased wear on water-delivery and treatment systems, and high demand for water during cleanup operations by residents of communities affected by ash fall. The most common change in water quality results from the suspension of ash in uncovered reservoirs, lakes, streams, and water-catchment systems. Ash fall can cause water turbidity to increase, and consumption of highly turbid water may constitute a health hazard because excessive turbidity can protect pathogenic microorganisms from the effects of disinfectants and stimulate the growth of bacteria in distribution systems. Fresh volcanic ash typically lowers the pH of water, and acidic water leads to corrosion of brass fixtures, copper plumbing, steel tanks, heating elements in hot-water heaters, and concrete.

Volcanic ash suspended in water can clog and damage filters at intake structures and treatment plants, and ash can increase wear on pumps and other equipment used in water-delivery systems. The high demand for water that typically occurs after an ash fall can lead to temporary water shortages.

Water supply intakes should be closed before turbidity and acidity levels become excessive. Regular monitoring will determine when such levels are reached and indicate when the intakes can be opened again. As the fine ash can remain in suspension for long periods (days to weeks), a coagulation-flocculating agent may need to be added. Alum is found to be the best agent.

To reduce the physical damage to water supply systems, equipment and pumps should be covered when there is an impending ash fall, and the ash should be removed before normal operations resume.

3.6.6 Waste Water

Sewage and storm water systems are vulnerable to damage because ash can block pipes and canals, increase wear on pumps and other machinery, and interfere with water-treatment processes. When ash falls on impervious surfaces such as roads and roofs, the ash is easily washed into waste water systems by rain and by water used during clean-up operations.

Ash-laden sewage that enters a treatment plant may overload equipment and filters designed to trap solid debris at both pre-treatment and primary treatment stages. Milliscreens, mechanical

grit and sludge removal mechanisms, comminutors and other equipment may become damaged. Ash falling directly into sedimentation tanks will add to the volume of material which must be removed.

Volcanic ash that enters secondary treatment facilities, such as oxidation ponds or biofilters, will tend to reduce or halt the oxidation process until the ash settles out or is removed. Ash may also affect the acidity or toxicity level of effluent to such an extent that bacterial growth may be damaged or lost.

Removing ash from sewage and waste water systems is time-consuming and costly. Keeping as much ash as possible from entering a community's waste water system is a top priority for reducing the potential effects of ash fall. It is especially important to keep ash out of the wastewater and sewage collection systems if it is raining during the ash fall event.

3.7 Agriculture and Forestry Impacts

Ash fall can have serious detrimental effects on agricultural crops and livestock depending on ash thickness, the type of growing conditions of a crop, the presence of soluble fluoride on the ash, timing and intensity of subsequent rainfall, condition of pasture and animals prior to ash fall, and availability of uncontaminated feed and water. The abrasiveness of ash can also damage farm machinery and equipment.

Flourine poisoning and death can occur in livestock that graze on ash-covered grass if fluoride is present in high concentrations. It may be advisable to sample and analyze ash or ash-coated vegetation to determine whether this potential hazard exists for livestock in areas covered by ash – even if it is just a dusting. Livestock eating pasture that is contaminated with ash can suffer and die from gastrointestinal blockages.

Survival of agricultural crops and pasture is often severely limited when ash thickness is greater than 4-6 inches. Young forests are most at risk from ash fall. Stands of trees less than two years old are likely to be destroyed by ash deposits thicker than about five inches. Ash fall alone is not likely to kill mature trees, but, the accumulated weight from a large ash fall can break large branches.

When ash falls destroy pastures, livestock need to be supplied with all their feed and water in order to survive in the short-term. When pastures are subjected to repeated ash falls and remobilization of ash by wind, evacuation of livestock to areas with good quality feed and water may be prudent. Even after evacuation, long-term inhalation of ash and exposure to fluorine may result in reduced productivity.

Strategies for reducing the effects of ash on agricultural machinery involve frequent oil changes, cleaning or replacing air filters often, using air pressure (< 30 lbs/in²) to blow ash from electrical equipment and other essential engine components, and frequently cleaning vehicles with water to wash away the ash.

Humboldt County Emergency Operations Plan
VOLCANO ASH CONTINGENCY PLAN

Adopted 15 July 2014

4 PREPARATIONS

4.1 Local Volcano Ash Fall Event Mitigation and Response Planning

The Humboldt County Emergency Operations Plan (EOP) addresses the planned response to extraordinary emergency situations associated with natural disasters, technological incidents, and national security emergencies in or affecting Humboldt County. The EOP guides the overall actions of emergency responders and provides a framework into which this Volcano Ash Contingency Plan will address specific ash fall-related response issues.

Mitigation actions involving volcano ash incidents will normally be broken down into two categories: 1) Pre-event readiness, and 2) Emergency response. The extent to which any mitigation operations are conducted will be predicated on the actual situation and the need for government response and actions.

(1) Pre-Volcano Ash Fall Event Readiness Actions

In this phase, the volcano ash fall event has not occurred. But, a volcano with the potential to impact Humboldt County is either projected to erupt or has erupted and prevailing conditions and forecasts are indicating possible windblown ash could impact Humboldt County.

- EOC Level 1 activation – Level 1 means a minimum of two persons closely monitoring the situation and reporting to the Incident Commander. A Level 2 EOC activation may be required as the event progresses.
- Close monitoring of source volcano event status
- Close monitoring of weather forecast projections
- Dissemination of volcano ash awareness and preparedness information to the public through various outlet sources
- Mobilization of response resources

(2) Volcano Ash Fall Emergency Response Actions

In this condition, volcano ash fall is occurring or has occurred and immediate mitigation and emergency response measures are required.

- EOC Level 2 minimum activation – Level 2 means the Incident Commander, the Command Staff, the Section Chiefs, and those other Branches and Units and Agency Representatives as are appropriate for the immediate situation. A higher Level 3 EOC activation will be implemented when warranted.
- Deployment of public safety resources throughout impacted areas
- Rescue of persons imperiled or trapped by ash fall conditions
- Appropriate public information broadcasts
- Initiation of preparatory and emergency evacuation of threatened populations
- Protection of essential services and critical infrastructure

4.2 Pre-Emergency Preparations

County departments and Operational Area agencies with responsibilities during a volcano ash event must ensure their personnel are properly trained. They should identify needed procedures, equipment, and other resources and pre-position them for an optimum response to emergency situations. These actions should include:

- Ensuring that multi-agency and multi-jurisdictional coordination compacts/agreements between Humboldt County and local governments, including special districts and state agencies, are in place.
- Ensuring current contact lists for agencies with responsibilities during an ash fall event are correct and up-to-date.
- Reviewing & updating the Volcano Ash Contingency Plan in accordance with guidelines in the Humboldt County Emergency Operations Plan.

4.3 Ongoing Volcano Monitoring Activities

It is important to note that, of the 169 volcanoes identified in the national report on volcanic threat published by the USGS in 2005 (USGS Open-File Report 2055-1164 and 2011 update), 18 are identified in the highest of five threat group categories – two of those Very High Threat Volcanoes are Mt. Shasta and Mt. Lassen. Also, Mt. Konocti is in the second-highest threat group category. Those three high projected threat level volcanoes are well-monitored by the USGS which allows the ability to track detailed changes in real-time and to develop, test, and apply models of ongoing and expected activity.

The **U. S. Geological Survey (USGS) Volcano Hazards Program** monitors volcanoes, assesses their hazards, responds to volcanic crises, and conducts research to fulfill a Congressional mandate that the USGS issue “timely warnings” of potential volcanic hazards to responsible emergency-management authorities and to the populace affected. USGS Volcano Hazards Program information can be accessed at:

<http://volcanoes.usgs.gov/>

The **USGS California Volcano Observatory (CalVO)** in Menlo Park, California, has responsibility for monitoring all volcanoes in the states of California and Nevada. During periods of quiescence, CalVO watches for signs of unrest, conducts research related to volcanic hazards, and provides long-term hazard assessments to government agencies, private industry, non-governmental organizations, educational institutions, and the public. As a volcano moves from quiescent to active, CalVO will issue hazard alerts, provide timely information as volcanic activity ramps up, and, as importantly, as the volcano returns to quiescence. CalVO information can be accessed at: <http://volcanoes.usgs.gov/observatories/calvo/>.

4.4 USGS Volcano Event Notification Systems

The USGS Volcano Hazards Program adopted a common alert-notification system in 2007 for characterizing unrest and eruptive activity at all U. S. volcanoes. The common alert-notification system has two parts – a four-tiered Volcano Alert Level and a four-tiered Aviation Color Code.

The Volcano Alert Level uses Normal, Advisory, Watch, and Warning to inform people on the ground about a volcano's status, and levels are issued in conjunction with the Aviation Color Code. Levels are accompanied by text concerning the specific nature of the unrest or eruption and about potential or current hazards.

The Aviation Color Code uses Green, Yellow, Orange, and Red to characterize volcanic ash hazards to aviation. The color codes are in accord with the International Civil Aviation Organization procedures recognized by pilots, dispatchers, and air-traffic controllers. The USGS Alaska Volcano Observatory (AVO) in Anchorage, Alaska, uses satellite-based monitoring of volcanic ash plumes and models ash plume trajectory and fallout. The AVO provides all volcano-related aviation hazard information to the U. S.

Changes in alert levels are communicated directly to public officials and emergency management agencies in California and Nevada by the USGS California Volcano Observatory (CalVO) in Menlo Park, California. That information pathway is followed by issuance of a more public Volcanic Activity Notice (VAN) and a Volcano Observatory Notice for Aviation (VONA).

The VAN consists of a formatted written message describing current activity at the volcano and a forecast of likely outcomes and impacts.

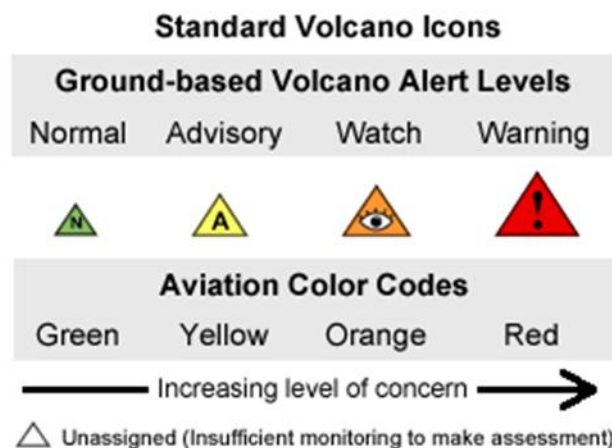
The VAN goes out via email and FAX to federal, state, local, and tribal governmental agencies and the media. The message is immediately posted on the CalVO website (<http://volcanoes.usgs.gov/observatories/calvo/>) and updated on the Volcano Hazards Program (VHP) website (<http://volcanoes.usgs.gov/>). Additional VANs are released as needed.

The VONA is a derivative product of the VAN and contains information in a format specifically intended for aviation users of volcano hazard information. A VONA is produced automatically and sent via email and FAX to aviation agencies and aviation industry users who have requested such information. The CalVO details expertise from the AVO for VONA information.

The following descriptions show the six different combinations of terms and colors that are possible to describe levels of activity at a volcano. The icons were created using a letter or image for the volcano alert level and an increasing triangle size in conjunction with the color for the aviation color



The NORMAL / GREEN icon is used when a non-erupting volcano is exhibiting typical background activity (including steaming, seismic events,



thermal feature, or degassing), as long as such activity is within the range of typical non-eruptive phenomena seen at the volcano.



The ADVISORY / YELLOW icon is used when a volcano is exhibiting signs of elevated unrest above known background activity.

The WATCH / ORANGE icon is used when a volcano is exhibiting heightened or escalating unrest with increased potential of eruption, timeframe uncertain OR an eruption is underway that poses limited hazards including no or minor volcanic-ash emissions.



The WARNING / ORANGE icon is used when a major eruption is imminent, underway, or suspected but it poses limited hazards to aviation because of no or minor volcanic-ash emissions (e.g., an eruption with only substantial lava flows).



The WATCH / RED icon is used when an eruption is underway that poses limited hazards to ground-based communities but includes significant emission of ash into the atmosphere that could affect aviation



The WARNING / RED icon is used when a major eruption is imminent, underway, or suspected with hazardous activity both on the ground and in the air

The UNASSIGNED icon is used for volcanoes where ground-based instrumentation is insufficient to establish that a volcano is in a typical background level (GREEN / NORMAL). When activity at such a volcano increases to the point of being detected by remote sensing, distant seismic networks, or eye witness reports, an alert level and color code are then assigned accordingly. When activity decreases, the volcano goes back to UNASSIGNED without going through GREEN / NORMAL.

4.5 Public Alerting and Warning Systems

Emergency Alert System

The Emergency Alert System (EAS) allows real-time emergency event notifications to the public via radio and television broadcasts. All local radio and television broadcast stations participate in the EAS.

NOAA Weather Radio

NOAA Weather Radio (NWR) is a nationwide network of radio stations broadcasting continuous weather information directly from the nearest National Weather Service (NWS) office. NWR broadcasts official Weather Service warnings, watches, forecasts, and other hazard information 24 hours a day, 7 days a week.



Working with the Federal Communication Commission (FCC) EAS, NWR is an "All Hazards" radio network which makes it a single source for comprehensive weather and emergency information. It is



provided as a public service by NOAA. NWR requires a special radio receiver or scanner capable of picking up the signal.

Telephone Emergency Notification System

A county-wide “reverse calling” or Telephone Emergency Notification System (TENS) is in place and can be utilized for emergency notifications to the public regarding event conditions. The system has the ability to call and deliver a short recorded message to all publicly-listed land line telephones in the Operational Area or to geographically-targeted areas in the event the situation requires immediate action.

Responding Agencies

Emergency responders may do a sweep of the affected area using loudspeakers and personal contact.

Local Media

Normal broadcast media (radio/television) can be utilized to inform the public of anticipated threats or possible emergency actions in the near future.

Social Media

Social media is becoming increasingly important to disaster survivors and emergency managers. Several forms of electronic communication, such as web sites for social networking and microblogging, allow users to create online communities to share information, ideas, personal messages, and other content (such as videos).

4.6 Public Information Access

The National Weather Service Weather Forecast Office maintains a website (<http://www.wrh.noaa.gov/eka>) which displays forecast and warning information for Humboldt, Del Norte, Mendocino and Trinity Counties.

EDIS (Emergency Digital Information Service) is available for public access via the internet (<http://edis.oes.ca.gov/>). California emergency managers use EDIS to alert and inform the news media and the public by providing detailed information regarding the emergency. Local emergency public information announcements will be posted on EDIS.

The California Office of Emergency Services’ MyHazards website is available to the public (<http://myhazards.calema.ca.gov/>). This website can be used to identify the hazards that exist in a particular area. It also provides preparedness information.

The Centers for Disease Control and Prevention web site (www.bt.cdc.gov/disasters/floods/) provides excellent personal safety-related information about preparing for and recovering from impact events.

The Federal Emergency Management Agency publication, “Are You Ready? Guide”, gives in-depth preparedness information to citizens (www.fema.gov/areyouready/flood.shtm/).

The U. S. Geological Survey web site (<http://www.usgs.gov/>) provides all manner of hazard-related information to the public.

Humboldt County Emergency Operations Plan
VOLCANO ASH CONTINGENCY PLAN

The USGS Volcano Hazards Program information can be accessed at:
<http://volcanoes.usgs.gov/>

The USGS California Volcano Observatory (CalVO) information can
be accessed at: <http://volcanoes.usgs.gov/observatories/calvo/>.

During any event in which the Emergency Operations Center is activated, the Public Information Officer may activate a public information line. (268-2530 or 866-360-3605) This line would have a pre-recorded message regarding event information.

The Humboldt County Sheriff's Office of Emergency Services maintains additional emergency related links on its website (www.co.humboldt.ca.us/sheriff/oes).

5 CONCEPT OF OPERATIONS

The RESPONSE OPERATIONS section should be immediately consulted at the onset of a volcanic and/or possible ash fall event.

5.1 Emergency Response Objectives

- Notify residents of the impending hazard
- Assist in mobilizing community resources to respond to the hazard conditions and results
- Evacuate individuals from threatened areas as needed
- Rescue individuals trapped by event impacts
- Limit non-resident access to the area
- Provide appropriate security to evacuated areas
- Limit damage to property through salvage and security
- Integrate fire, law enforcement, and emergency medical services to optimize performance under event conditions
- Expedite the restoration of normal functions in the areas subject to ash fall impacts

5.2 Pre-Emergency Preparations

Ash fall events do not occur without some volcanic activity-related warning. Area emergency officials receive early predictive notification hours and even days before significant events occur giving them ample time to implement planning and pre-response efforts.

Should an ash fall event be likely or projected to occur, immediate outreach activities should be implemented for the citizens and entities in Humboldt County. Information about the event and guidelines on preparedness activities to be performed by citizens and entities before, during, and after an ash fall event should be promulgated using all manner of outreach methods.

5.3 Emergency – Contingency Plan Activation

This Volcano Ash Contingency Plan will be activated by the Director of Emergency Services (Humboldt County Sheriff) or the Director's designated representative when any identified volcano hazard site eruption occurs. The Director will authorize at least a Level 2 activation of the Emergency Operations Center. Level 2 means the Incident Commander, the Command Staff, the Section Chiefs, and those other Branches and Units and Agency Representatives as are appropriate for the immediate situation. If an ash fall impact situation warrants, a full EOC Level 3 activation may be initiated. Or, a reduced "monitoring" Level 1 activation may be instituted after the situation is fully analyzed.

5.4 Agency Responsibilities During Ash Fall Operations

Many agencies with operational responsibilities within the Humboldt Operational Area have specific duties to perform during an ash fall event. This section provides a listing of those duties in bullet format. The listings are organized into sections for Humboldt County Departments, local

government fire, law, and emergency medical entities, other local government entities, non-governmental organizations, state entities, and federal entities.

Note: See the Humboldt County Emergency Operations Plan for expanded responsibilities.

5.4.1 Humboldt County Departments

Sheriff's Office

- Alert and evacuate people in the hazard impact areas
- Assist various agencies in search and light rescue
- Maintain law and order in evacuated areas
- Provide security for facilities and resources
- Coordinate traffic control with the California Highway Patrol
- Collect information and report it to the EOC

Office of Emergency Services

- Per the Director of Emergency Services, activate the Emergency Operations Center to the degree necessary
- Coordinate and support the operations of the Emergency Operations Center
- Maintain liaison with:
 - National Weather Service Office Eureka
 - California Office of Emergency Services, Coastal Region
 - City and Community EOCs
 - Other involved agencies and organizations
- Request and coordinate mutual aid
- Issue advisory and alerting information to OES Deputy Coordinators in cities and communities
- Prepare emergency proclamation as directed
- Prepare situation reports

Public Works

- Maintain and/or restore County roads
- Coordinate with the California Department of Transportation (Caltrans) for the maintenance of state highways
- Clear debris
- Maintain public facilities
- Assist operators of mass care facilities by providing required engineering services
- Provide technical supervision over emergency construction
- Provide transportation for personnel and materials to assist operations
- Provide damage estimates for County facilities
- Assist in heavy rescue
- Maintain an inventory of facilities and equipment at airports throughout the County
- Plan for aerial reconnaissance and resupply in support of emergency operations
- Coordinate aerial operations
- Allocate facilities and equipment at airports to the various users

- Coordinate with the Roads department and the Sheriff's Office the use of highways and roads as emergency landing strips for rotary wing and light fixed wing aircraft
- Collect information and report it to the EOC

Department of Health and Human Services

Public Health Branch

- Maintain an inventory of health and medical resources; plan for their emergency allocation
- Determine public health hazards
- Establish standards for control of public health hazards
- Provide technical guidance and supervise activities to control public health hazards
- Coordinate medical treatment for sick and injured persons
- Coordinate with care and shelter agencies on health and medical support in mass care facilities
- Manage the identification and disposition of the deceased in coordination with the Coroner
- Coordinate the disposition of dead livestock with the communities and the Agricultural Commissioner
- Collect information and report it to the EOC

Environmental Health Division

- Determine operational condition of public water and sewer systems
- Dispatch teams to survey potable water systems and determine status of potable water
- Dispatch teams to survey sewage and wastewater treatment systems
- Ensure both water and sanitation systems are continually monitored
- Develop a transportation and distribution strategy for potable water
- Collect information and report it to the EOC

Social Services Branch

- Coordinate the planning for mass care facilities in the cities and communities subject to inundation
- Supervise the operations of mass care facilities throughout the County
- Inventory and allocate temporary housing
- Maintain a register of displaced persons
- Provide rehabilitation and counseling services
- Provide financial and other types of assistance to displaced persons
- Coordinate with the American Red Cross
- Collect information and report it to the EOC

Mental Health Branch

- Identify and assess levels of mental health care needed
- Assess status of Mental Health facilities
- Inspect and assess the status of medications and other consumables for availability and usability

- Plan and coordinate deployment of clinical and support staff to establish sites as needed
- Collect information and report it to the EOC

Agricultural Commissioner

- Initiate request for Secretarial Disaster Designation from the United States Department of Agriculture (USDA) for agricultural losses
- Establish a food inventory survey with emphasis on isolated areas and those subject to isolation
- Initiate emergency procurement of food and its delivery to isolated areas
- Allocate and distribute USDA donated food to mass care centers
- Estimate damage to livestock and other agricultural resources
- Coordinate with the California Department of Food and Agriculture the procurement and distribution of feed grains for isolated or co-mingled livestock
- Prevent and/or control outbreaks of plant or animal diseases
- Collect information and report it to the EOC

Coroner

- Perform body recovery operations
- Establish a body processing area and a temporary morgue
- Process personal belongings
- Coordinate with appropriate agencies
- Collect information and report it to the EOC

5.4.2 Local Government Fire, Law, EMS

Fire Agencies

- Coordinate search and rescue operations with the Sheriff's Office and among the various fire agencies in the County
- Coordinate fire suppression with particular emphasis in evacuated areas
- Coordinate assistance in first aid
- Assist with protection of property
- Collect information and report it to the EOC

Law Enforcement Agencies

- Assist in alerting and evacuating people
- Direct people to mass care centers when necessary
- Assist with traffic control
- Assist with evacuation operations
- Maintain law and order during evacuation operations and in evacuated areas
- Provide security for facilities and resources
- Collect information and report it to the EOC

Emergency Medical Services

- Provide triage for injured persons
- Provide aid/medical treatment for injured persons
- Provide transportation of injured persons to the hospital

- Collect information and report it to the EOC

5.4.3 Other Local Government Entities

Care and Shelter Agencies

- Establish and maintain contact with the DHHS Social Services Branch
- Maintain information on the status of all mass care facilities that are operational
- Coordinate with the Public Health representative on medical or sanitation assistance required in support of mass care facilities
- Provide daily reports to the EOC on the status of mass care facilities, including number of occupants and supply levels
- Collect information and report it to the EOC

The local Red Cross and Salvation Army will provide temporary shelter and other basic needs to evacuees where necessary. Area Voluntary Organizations Active in Disaster (VOAD) agencies will provide support as needed.

5.4.4 Other Non-Governmental Organizations

HAM Radio Operators

- Facilitate information flow between locations within the OA and the EOC
- Collect information and report it to the EOC

Office of Emergency Services Deputy Coordinators

- Provide warning information to rural communities
- Provide response and recovery services to rural communities
- Act as contact point between Humboldt County OES and his or her community
- Collect information and report it to the EOC

5.4.5 State Government Entities

California Conservation Corps

- Provide evacuation assistance
- Provide debris removal
- Collect information and report it to the EOC

California Department of Transportation

- Patrolling of roads
- Respond to specific incidents
- Deploy road advisory signs and road closed signs
- Deploy barricades
- Remove or repair blocked sections of the highway
- Assist the California Highway Patrol in traffic control
- Coordinate local road damage estimates
- Collect information and report it to the EOC

California Department of Water Resources

- Support local emergency response

California Office of Emergency Services

- Coordinate State's response to requests for assistance from Operational Area
- Coordinate State mutual aid efforts when the Governor declares an emergency

California Highway Patrol

- Provide primary responsibility for traffic supervision and control on all state highways in unincorporated areas of the state
- Assist in moving vehicles and pedestrians from hazard areas
- Assist local law enforcement agencies in establishing evacuation routes and traffic control procedures
- Assist in preventing traffic from reentering hazard areas
- Provide traffic control in and around evacuation areas and mass care shelters
- Collect information and report it to the EOC

5.4.6 Federal Government Entities

United States Army Corps of Engineers

- Support immediate emergency response priorities
- Sustain lives with critical commodities, temporary emergency power and other needs
- Initiate recovery efforts by assessing and restoring critical infrastructure
- Provide technical assistance, supplies, and equipment
- Rescue operations
- Emergency repair and restoration of public infrastructure works
- Post-ash impact response
- Collect information and report it to the EOC

United States Coast Guard

- Assist in search and rescue
- Alert water traffic outside and near Humboldt Bay entrance
- Collect information and report it to the EOC

United States National Weather Service Office Eureka

- Issue and disseminate weather forecasts, warnings, and statements
- Ensure public access to weather information through the NWS Eureka website and social media
- Maintain liaison with other involved city, tribal, and community agencies or organizations
- Provide weather forecasts and hydrologic information to the EOC

5.5 Radio Communications Shared Channels

The California Office of Emergency Services has licensed the following VHF High Band voice radio channels for use by public safety agencies in California. (The

listed “V” channels are also authorized for use by the U. S. Department of Homeland Security.) The available channels are meant for use during emergent events - they are not for everyday use. The appropriate below listed channels should be installed in all public safety radios to be available for use as needed.

DISPLAY	PURPOSE	RX FREQUENCY
CALAW1	California LE Mutual-Aid	154.92000 N
CALAW2	California LE Mutual-Aid	154.93500 N
VLAW31	National LE Mutual-Aid	155.47500 N
CALCORD	California On-Scene Coordination	156.07500 N
VFIRE21	California Fire Mutual-Aid	154.28000 N
VFIRE22	California Fire Mutual-Aid	154.26500 N
VFIRE23	California Fire Mutual-Aid	154.29500 N
VMED28	EMS-Medical Interoperability	155.34000 N
SAR	National SAR Common Channel	155.16000 N
VCALL10	Any Public Safety Interoperability	155.75250 N
VTAC11	Any Public Safety Interoperability	151.13750 N
VTAC12	Any Public Safety Interoperability	154.45250 N
VTAC13	Any Public Safety Interoperability	158.73750 N
VTAC14	Any Public Safety Interoperability	159.47250 N

N = Narrow Band

5.6 Telephone Emergency Notification System (TENS) Activation

The activation of the Telephone Emergency Notification System (TENS) by the Sheriff’s Office Dispatch Center is through the EOC. The TENS system can be utilized to notify residents of emergent ash fall conditions.

5.7 Post-Emergency Operations

All post-emergency operations in response to ash event effects will be in accordance with those procedures established in the Humboldt County Emergency Operations Plan.

6 NOTIFICATION PROCEDURES

Emergency response agencies will use all means available to notify the public within and adjacent to their jurisdictions. Notification methods include activation of the Emergency Alert System, NOAA Weather Radio, activation of the “reverse calling” or Telephone Emergency Notification System, personal contact by responding agencies, and local broadcast media.

7 EVACUATION PROCEDURES

Should the Director of Emergency Services (Sheriff) order an evacuation of persons from ash fall areas, Operational Area (OA) response agencies shall coordinate their operations through the OA Emergency Operations Center.

All evacuation-related actions will be in accordance with those procedures set forth in the Humboldt County Evacuation Plan.

8 SEARCH AND RESCUE PROCEDURES

All search and rescue operations shall be in accordance with the standard operating procedures of the agency involved. All search and rescue operations shall be coordinated with the Humboldt County Emergency Operations Center to ensure any required additional resource assignments are prioritized and based on need.

9 DAMAGE ASSESSMENT PROCEDURES

All initial damage assessment operations shall be conducted by the agency responsible for field notifications for that area. Initial assessment results shall be immediately communicated to the Humboldt County Emergency Operations Center for accounting and for response prioritization planning.

10 POST-ASH FALL EVENT ACTIONS

As ash fall impacts may lessen and increase with volcano eruption severity and the wind pattern, transition from the Response Phase to the Recovery Phase may be incremental. Transitional activities should occur as early as possible in the event timeline. All Recovery Phase actions will be guided by the Humboldt County Emergency Operations Plan, Part 4.

SUPPLEMENTS

11 REFERENCE LINKS

California Office of Emergency Service's MyHazards
<http://myhazards.calema.ca.gov/>).

Centers for Disease Control and Prevention
www.bt.cdc.gov/disasters/floods/

Federal Emergency Management Agency publication, "Are You Ready? Guide" www.fema.gov/areyouready/flood.shtm/

Humboldt County Emergency Operations Plan and other specific event contingency plans www.co.humboldt.ca.us/sheriff/

Humboldt Operational Area Hazard Mitigation Plan
<http://www.co.humboldt.ca.us/natural-resources/hazardmitigation/>

National Weather Service Office Eureka <http://www.wrh.noaa.gov/eka/>

NOAA Weather Radio <http://www.weather.gov/nwr/>

State of California, Emergency Plan, July 2009
http://cms.calema.ca.gov/prep_sep.aspx

USGS California Volcano Observatory (CalVO)
<http://volcanoes.usgs.gov/observatories/calvo/>

USGS Volcano Hazards Program <http://volcanoes.usgs.gov/>

The Health Hazards of Volcanic Ash:
http://www.ivhhn.org/images/pamphlets/health_guidelines_english_print_imposed.pdf

Guidelines on Preparedness Before, During, and After an Ash Fall:
http://www.ivhhn.org/images/pamphlets/preparedness_guidelines_english_print_imposed.pdf

12 ACRONYMS

AVO	Alaska Volcano Observatory
CALTRANS	California Department of Transportation
CaIVO	California Volcano Observatory
CDC	Centers for Disease Control
DHHS	Department of Health and Human Services
EAS	Emergency Alert System
EDIS	Emergency Digital Information System
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
OA	Operational Area
OES	Office of Emergency Services
TENS	Telephone Emergency Notification System
USDA	United States Department of Agriculture
USGS	United States Geological Survey
VAN	Volcanic Activity Notice
VOAD	Voluntary Organizations Active in Disaster
VONA	Volcano Observatory Notice for Aviation

13 GLOSSARY

Note: Includes some volcano-related terms not found in Plan

ACTIVE VOLCANO: A volcano that is currently erupting or has erupted during recorded history.

AIR FALL (also ASH FALL): Volcanic ash that has fallen through the air from an eruption cloud. A deposit so formed is usually well-sorted and layered.

ASH (volcanic): Fragments less than 2 millimeters (about 1/8 inch) in diameter of lava or rock blasted into the air by volcanic explosions.

ASH CLOUD: Cloud of ash formed by volcanic explosions or derived from a pyroclastic flow.

ASH FLOW: A pyroclastic flow consisting predominantly of ash-sized particles.

DEBRIS AVALANCHE: A rapid and unusually sudden sliding or flowage of unsorted masses of rock and other material.

DEBRIS FLOW: A flowing mixture of water and rock debris – sometimes referred to as a lahar or mudflow.

DORMANT VOLCANO: An active volcano that is in repose (quiescence) but is expected to erupt in the future.

EJECTA: Material that is thrown out by a volcano including pyroclastic material.

EXTINCT VOLCANO: A volcano that is not expected to erupt again.

LAHAR: A flowing mixture of water-saturated rock debris that forms on the slopes of a volcano and moves downslope under force of gravity – sometimes referred to as a debris flow or mudflow.

LAVA: The term used for magma once it has erupted onto the Earth's surface.

LAVA FLOW: Stream of molten rock that erupts relatively non-explosively from a volcano and moves slowly downslope.

MAGMA: Molten rock containing liquids, crystals, and dissolved gases that forms within the upper part of the Earth's mantle and crust. When erupted onto the Earth's surface, it is called lava.

MUDFLOW: The mixture of water and debris (intermediate between a volcanic avalanche and a water flood) that forms on the slopes of a volcano – sometimes called a debris flow or lahar.

PUMICE: A light-colored, frothy volcanic rock formed by the expansion of gas in erupting lava. Commonly perceived as lumps or fragments of pea size and larger but can also occur abundantly as ash-sized particles. Because of its numerous gas bubbles, pumice commonly floats on water.

PYROCLASTIC FLOW: Lateral flowage of a turbulent mixture of hot gases and unsorted pyroclastic material (volcanic fragments, crystals, ash, pumice, and glass shards) that can move at speed (50 to 100 miles per hour).

TEPHRA: Solid material of all sizes (ash, lapilli, blocks, bombs) explosively ejected from a volcano into the atmosphere.

VOLCANO: A vent (opening) in the surface of the Earth through which magma erupts; it is also the land form that is constructed by the erupted material.

VOLCANIC AVALANCHE: A large, chaotic mass of soil, rock, and volcanic debris moving swiftly down the slopes of a volcano (also called debris avalanche).

Humboldt County Emergency Operations Plan
VOLCANO ASH CONTINGENCY PLAN

AGENDA ITEM NO.
C-17



SHERIFF'S OFFICE
COUNTY OF HUMBOLDT

826 FOURTH STREET
EUREKA, CALIFORNIA 95501-4518 PHONE (707) 445-7251

For the meeting of: **July 15, 2014**

Date: June 17, 2014
To: Board of Supervisors
From: MICHAEL T. DOWNEY, SHERIFF
Subject: Volcano Ash Contingency Plan

RECOMMENDATION(S):

That the Board of Supervisors approve the County of Humboldt Volcano Ash Contingency Plan.

SOURCE OF FUNDING: 1100 General Fund

DISCUSSION:

During a significant incident or declared local emergency event, the overall priority of the County and of emergency management agencies is to provide maximum protection to public health and property. The County, acting as the lead local government entity under California's Standardized Emergency Management System, is responsible for coordinating the overall local government organized response to emergency hazard events. In support of that primary effort as delineated in the Humboldt County Emergency Operations Plan, the Volcano Ash Contingency Plan was developed to provide specific volcano event impact-related information and recommended actions in reaction to Operational Area government entities to guide coordinated response efforts. The new Volcano Ash Contingency Plan is an original occurrence - no previous plan was in place.

No volcanoes are located in Humboldt County. However, there has been significant volcanic activity to the east only 65 miles from our eastern border (115 miles from Eureka) and other volcanoes are located farther away to the northeast and to our southeast. The only direct volcanic hazard which could affect Humboldt County is volcanic ash put into the air following an eruption. The probability of a volcano ash event occurring in Humboldt County is extremely low due to prevailing winds, but the impacts would be high throughout the County. Even a small amount of volcanic ash distributed across surfaces and into areas of access can have widespread, significant detrimental impacts on human and animal health, trade, or local infrastructure and operations, and agriculture. While the specific impacts of an ash fall event are very dependent on the scope of the event, those impacts would be long-term and occur over a wide area. Significant immediate response, mitigation and recovery efforts would need to be implemented regardless of the event scope.

Prepared by M. Modell CAO Approval Amy Jensen
 REVIEW: Auditor MSM County Counsel mg Persons _____ Risk Manager Of Other _____

TYP. OF ITEM:
 Consent
 Department
 Public Hearing
 Other _____

BOARD OF SUPERVISORS, COUNTY OF HUMBOLDT
 Upon motion of Supervisor Sundberg
 Seconded by Supervisor Loiseace
 And unanimously carried by those members present.
 The Board hereby adopts the recommended action contained in this report.

PREVIOUS ACTION/REFERRAL:

Board Order No. _____
 Meeting of: _____

Date: July 15, 2014
 Kaitly Hayes, Clerk of the Board
 By: Ann Hutchwell

14 VOLCANO ASH CONTINGENCY PLAN ADOPTION

This Plan was adopted on 15 July 2014 by the Humboldt County Board of Supervisors.