

# **VOLCANIC ASHFALL CHECKLISTS**

**DEVELOPED BY THE  
ALASKA NATIVE TRIBAL HEALTH CONSORTIUM  
EMERGENCY PREPAREDNESS PROGRAM**

**Michael J. Bradley  
ANTHC Emergency Preparedness  
Program Manager  
907 729-3653  
[mjbradley@anmc.org](mailto:mjbradley@anmc.org)**

**February 2009**

## **ANTHC VOLCANO ASH FALL CHECKLISTS**

### **BASIC ASH FALL CHECKLIST FOR HOME AND FAMILY:**

- Review home emergency plan, including contact numbers
- You will be notified via phone message or call the ANMC Hotline 729-5678 for work information and updates. Also, listen to KFQD 750 a.m. radio station for updates.
- Have NIOSH approved dust/mist masks ready for each family member – or wet hanky or wash cloth will do
- Keep water, food supplies stocked and ready
- Get an extra air filter for your car or plan on staying home (less driving)
- Have a plan elders and your pets (keep inside out of danger from ash)
- If ash fallout is heavy, drive below 35 mph (ash is slippery, be careful)
- Have goggles for each family member – goggles from snow machines work
- Keep doors and windows at home closed
- Have large plastic bags ready for computers
- Never clean ash with water, it makes mud (do not breathe dust)

### **Actions to be taken if an ash fall is imminent**

- Close doors and windows.
- Place damp towels at door thresholds and other draft sources. Tape draughty windows.
- Protect sensitive electronics and do not uncover until the environment is totally ash-free.
- Disconnect drainpipes/downspouts from gutters to stop drains clogging, but allowing ash and water to empty from gutters onto the ground.
- If you use a rainwater collection system for your water supply, disconnect the tank prior to ash falling.
- If you have chronic bronchitis, emphysema or asthma, stay inside and avoid unnecessary exposure to the ash.
- Ensure livestock have clean food and water.
- If you have children, know your school's emergency plan and have indoor games and activities ready.

### **What to do if volcanic ash is falling**

- Don't panic - stay calm.
- Stay indoors.
- If outside, seek shelter (e.g. car or building).
- Use a NIOSH approved dust/mist mask, handkerchief or cloth over your nose and mouth.
- If at work when ashfall starts, stay indoors until the ash has settled.

- Do not tie up phone lines with non-emergency calls.
- Listen to your local radio for information on the eruption and cleanup plans.
- Do not wear contact lenses as these will result in corneal abrasion.
- If there is ash in your water, let it settle and then use the clear water. If there is a lot of ash in the water supply, do not use your dishwasher or washing machine. Water contaminated by ash will usually make drinking water unpalatable before it presents a health risk.

## **ASH FALL CHECKLISTS FOR ANTHC**

### **Buildings and Equipment:**

- Stand up Emergency Operations Centers to coordinate preparation, response recovery actions.
- Assess all equipment and facilities to determine which would be the most affected by ash fall, and which are adequately and inadequately protected.
- Identify appropriate methods of protecting vulnerable equipment and facilities from ash.
- Develop a priority list of facilities that must be kept operative versus those that can be shut-down during and after ash falls.
- Implement communication plans and procedures for notifying employees of potential ash fall warnings, reducing or shutting down operations, and accelerating maintenance of buildings and machinery during cleanup operations.
- Stockpile spare parts for critical equipment, including oil and air filters and cleaning and disposal equipment.
- Do not start cleanup operations until the ash fall is over (except when buildings are threatened by overloading of roofs).
- Personal protection gear and logistical support will be needed for employees during ashy conditions, especially those involved in cleanup operations. For example, filter masks, respirators, eye protection, hats or helmets, food and water, auxiliary lighting, and even portable toilets to minimize walking traffic into buildings.
- Provide educational materials about ash to employees regarding physical properties of volcanic ash, potential health effects, and personal-protective equipment.
- Prioritize and sequence areas for cleanup (top to bottom) and coordinate with public organizations and communities.
- Identify short-term and long-term equipment availability and needs; consider resources that might be available elsewhere.

### **Keeping ash out of buildings**

- Restrict access to buildings to the most protected entrance to reduce the potential for ash to get inside.
- Establish an entry room or cleaning and decontamination rooms for people entering the building. Provide vacuum cleaners and brushes for people to remove

- as much ash as possible from clothing; provide shoe covers and disposable caps as appropriate. Remove outdoor clothing before entering a building as appropriate.
- Seal entrances and openings (doors, windows, dampers, air intakes). Place damp towels at door thresholds and other draft sources; tape drafty windows.
  - Establish any necessary, extra cleaning procedures to protect the interior environment.
  - Stockpile cleaning supplies, duct tape, disposal containers, vacuum cleaner bags and filters.
  - Use extra (and heavier) filters for external air intakes.

### **Protect computer systems**

Computer heads and discs, and any high-voltage circuits, are especially vulnerable to ash upset and damage. Ash on digital circuits will not cause much of a problem because of the low voltages involved. High-voltage or high-impedance circuits are very vulnerable to leakage caused by semiconductive ash. Ash that is acidic is conductive as well as corrosive. Continual cleaning and aggressive protection of computer systems should allow for continued operation in all but the heaviest ash fallout (Labadie, J.R., 1994).

### **Recommended steps for air-handling systems**

- Shut down air-handling and air-conditioning systems prior to or during the initial onslaught of ash fall.
- Close and seal air intakes; use internal circulation only to create positive pressure inside building.
- Close and seal windows, doors, and other openings of buildings.
- Before re-starting air-handling system, clean and remove ash from near external air intakes and roof area adjacent to the intakes; clean or replace filters; inspect, clean or lubricate moving portions of the system following prescribed routine maintenance procedures.
- Restrict vehicle and foot traffic near air intakes.
- Consider installing intake hoods that extend higher above the ground. Install pre-filters.

### **To restart air-handling systems:**

- Clean the air intakes and the roof area adjacent to the intakes.
- Clean or replace filters.
- Inspect, clean or lubricate moving portions of the system following prescribed routine maintenance.

### **Vehicles**

Driving

- Avoid driving in heavy ash conditions unless absolutely required.
- When required to drive in ashy conditions keep speed below 55 km per hour (35 mph) or lower. Do not follow too close to the car ahead, and use headlights on low beam.

#### Oil change and air filters

- Change oil often. In very dense ash conditions change oil at 80-160 km (50-100 mi) intervals. In light ash conditions change oil at 800-1,600 km (500-1000 mi) intervals. Lubricate all chassis components at each oil change.
- Clean air filters by back-flushing filter paper with compressed air (30 lbs/in<sup>2</sup>). Caution—blow element from inside (clean side) to outside (dirty side). DO NOT strike filters against anything. Air clean only. If unsure, have a qualified mechanic perform the air filter service. Inspect filters for dents or torn paper. Clean the inside of filters and the filter cover with damp cloth before reinstalling filter. Reinstall filter in housing and tighten on cover very tight, approximately one full turn with pliers after tightening. Do not exceed one full turn with pliers or you may damage the system.
- Commercial truck filters can be installed to increase the filtering capacity of the cleaner. This would be beneficial for vehicles operating continuously in extreme dust conditions.
- Air filter restriction gauges can be installed by qualified mechanics. The gauge will tell you when your air filter requires servicing in order to avoid over-servicing.
- DO NOT install hose from carburetor air intake (air clean) to inside of car. Outside dust and ash will be drawn into vehicle.
- Rags, or any other intended filtering material, should not be placed over the carburetor inlet inside the air cleaner element; serious damage to the engine and/or loss of vehicle control may result.

#### Outside vents

- Cover passenger compartment vent inlet (located at base of wind-shield and usually under hood) with thick, loosely woven felt-type material to filter air into vehicles. With vent filter in place, keep heater blower high. Blower will slightly pressurize inside of vehicle and keep dust from entering through body gaps or holes. If a vent filter is NOT installed, keep air conditioner and heater blowers off.

#### Notes

After running vehicles in heavy concentrations of ash, the equipment life of properly serviced vehicles, as outlined above, may be somewhat reduced, but the equipment probably will not have catastrophic failures. Failures attributable only to ash fall can be expected to occur within 30 days following the exposure period.

### **CLEAN UP**

## **Inside buildings and households**

In general surfaces should be vacuumed to remove as much ash as possible from carpets, furniture, office equipment, appliances, and other items. Portable vacuum systems equipped with high-efficiency particulate filtering systems are recommended whenever possible. The severity of ash intrusion depends on the integrity of windows and entrances, the air intake features, and the care exercised to control the transport of ash into a building or home via shoes and clothing. Care should also be taken to avoid further contamination during the emptying, cleaning, and maintenance of vacuum equipment.

### **Ash removal from buildings**

- Cleaning by blowing with compressed air or dry sweeping should be minimized.
- A dustless method of cleaning such as washing with water and an effective detergent/wetting agent is recommended. Damp rag techniques should be used whenever possible to remove the substance from small surface areas or flooring. On those areas where damp rag techniques cannot be implemented (for example, carpets) vacuum cleaning methods should be applied.
- After vacuuming carpets and upholstery may be cleaned with a detergent shampoo. Avoid excess rubbing action because the sharp ash particles may cut textile fibers.
- Glass, porcelain enamel and acrylic surfaces may be scratched if wiped too vigorously. Use a detergent soaked cloth or sponge and dab rather than wipe.
- High-shine wood finishes will be dulled by the fine grit. Vacuum surfaces and then blot with a cloth treated to pick up ash. A tack cloth used by furniture refinishers should work well.
- Floor sweepers with side brushes should not be used to clear aisles and floors because they may re-entrain dust particles into the air.
- Ash-coated fabrics should be rinsed under running water and then washed carefully.
- Soiled clothing will require extra detergent. Wash small loads of clothing, using plenty of water so the clothes will have room to move freely in the water. Do not mix heavily soiled clothes with garments that are lightly soiled.
- Be sure clothes are free of ash before putting them in an automatic dryer. Ash may scratch the inner surface of the dryer.
- For several months after an ash fall, filters may need replacing often. Air conditioner and furnace filters need careful attention. Clean refrigerator air intakes. Clean any surface that may blow air and recirculate the ash. Stove fans and vents should be cleaned thoroughly.
- Each employee should be responsible for clean-up of his/her own work area to minimize exposure potential during a work shift. This should be accomplished at the beginning of each workshift. Damp rag or vacuum techniques should be used during this operation.

## **Computer clean up**

- Clean and condition surrounding air to keep ash out of equipment.
- Cotton mat filters used in separate clean rooms were found to be best for filtering particles, but they reduce the air flow. A solution is to use larger fans to maintain required air flow. Rack-mounted equipment can be modified to add a larger fan, but smaller instruments or components with a built-in fan would require design change to increase fan capacity. Use fluted filters as a compromise; increases surface area but reduces air flow by only about 20%.
- Digital integrated circuits can vary 5-10% in performance (depending on type of circuit) and still be acceptable. It is difficult to generalize about other equipment (e.g. high-voltage power supplies).
- Humidifying ambient air (for example, wetting carpets) will help to control ash reentrainment.
- Ash on equipment can be blown out with compressed air. If the air is too dry, static discharge could damage sensitive components (for example, integrated circuits). If the air is too damp, the ash will stick. Relative humidity of 25-30% is best for compressed air.
- Cleaning with a pressurized water-detergent mix and a hot water rinse is quite effective. However, this process requires at least partial disassembly.
- Ash should be blown or brushed away from power supplies.
- Ash may have high static charge and be hard to dislodge, thus requiring brushing to dislodge particles.
- Accelerate filter change; use pre-filters.
- Change to absolute filters; these will keep out particles down to 1 micron and smaller.
- Keep computer power on to operate filtration, but don't run (especially disk drives).
- Maintain "room-within-a-room" configuration; restrict access; re-circulate air; accelerate cleaning of the critical area.

## **Appliance Clean up**

- To reduce ash infiltration and reduce the need for extensive maintenance of equipment, appliances, and machines, place coverings over the items as standard procedure.
- Carefully monitor vacuum cleaners to assure that filters and ash bags are changed when necessary.

## **Vehicle Clean up**

- Have a service garage clean wheel brake assemblies every 50-100 miles for very severe road conditions, or every 200-500 miles for heavy dust conditions. The brake assemblies should be cleaned with compressed air.
- Have service garage clean alternators winding with compressed air after heavy accumulation or every 500 to 1000 miles or after severe dust exposure.

- Clean the vehicle, including the engine, radiator, and other essential parts daily, if necessary, using water to flush the ash.
- Wash the engine compartment with a garden hose or steam cleaner. Be sure to seal off air intakes and electrical components before cleaning.

### **Cleaning up: outside**

Keep ash out of buildings, machinery, vehicles, downspouts, water supplies, and wastewater systems (for example, storm drains) as much as possible. The most effective method to prevent ash-induced damage to machinery is to shut down, close off or seal equipment until ash is removed from the immediate environment, though this may not be practical in all cases. Coordinate clean-up activities with your neighbours and community-wide operations. After an ash fall, remove ash from roofs in a timely manner to prevent streets from being repetitively cleaned.

### **Do**

- Put on a recommended mask before starting to clean. If you don't have one, use a wet cloth. Wearing protective eye wear (such as goggles) during clean-up is also advised in dry conditions.
- Moisten the ash with a sprinkler, before attempting to clean. This will help to stop the wind remobilizing it.
- Use shovels for removing the bulk of thick deposits of ash (over 1 cm or so); stiff brooms will be required to remove lesser amounts.
- Place the ash into heavy duty plastic bags, or onto trucks if available.
- Since most roofs cannot support more than four inches (10 cm) of wet ash, keep roofs free of thick accumulation.
- Volcanic ash is slippery. Use caution when climbing on ladders and roofs.
- Guttering systems clog very easily so, if fitted underneath your roof, sweep away from the gutters.
- Cut grass and hedges only after rain or light sprinkling and bag clippings.
- Seek advice from public officials regarding disposal of volcanic ash in your community. In most cases, ash should be separated from normal rubbish for collection for disposal at a designated location-mixing ash with normal rubbish can result in damage to collection vehicles and take up space in landfills.
- Dampen ash in yards and streets to reduce suspension of ash, however try to use water sparingly - do not soak the ash. Widespread use of water for clean-up may deplete public water supplies. Follow requests from public officials regarding water use during cleanup operations.
- Remove outdoor clothing before entering a building.

### **Don't**

- Do not soak the ash as it will cake into a hard mass, making cleanup more difficult. On roofs the added weight of the water will increase the risk of roof collapse.

- Do not dump the ash in gardens or on the roadside.
- Do not wash the ash into the guttering, sewers or storm drains. (It can damage waste water treatment systems and clog pipes).
- Do not drive unless absolutely necessary, driving stirs up the ash. Furthermore, ash is harmful to vehicles.

### **Cleaning up: inside**

In general, surfaces should be vacuumed to remove as much ash as possible from carpets, furniture, office equipment, appliances, and other items. Portable vacuum systems equipped with high-efficiency particulate filtering systems are recommended whenever possible. The severity of ash intrusion depends on the integrity of windows and entrances, the air intake features, and the care exercised to control the transport of ash into a building or home via shoes and clothing. Care should also be taken to avoid further contamination during the emptying, cleaning, and maintenance of vacuum equipment. In hot climates, where windows are permanently open, or absent, clean up of houses may be needed several times per day. Clean up inside should only be undertaken after the outside areas have been well cleared.

### **Do**

- Clean when public-works crews are cleaning the areas outside areas as a co-ordinate approach.
- Put on a dust mask before starting to clean. If you don't have one, use a wet cloth.
- Ensure good ventilation by opening all doors and windows before you start to clean.
- Only use one entrance to the building while cleaning to ensure occupants do not bring in ash into clean areas.
- Use a dustless method of cleaning such as washing with water and an effective detergent/wetting agent. Damp rag techniques or vacuuming should be used whenever possible. After vacuuming, carpets and upholstery may be cleaned with a detergent shampoo. Avoid excess rubbing action because the sharp ash particles may cut textile fibers.
- Glass, porcelain enamel and acrylic surfaces may be scratched if wiped too vigorously. Use a detergent soaked cloth or sponge and dab rather than wipe.
- High-shine wood finishes will be dulled by the fine grit. Vacuum surfaces and then blot with a wet cloth. A tack cloth used by furniture refinishers should also work well.
- Ash-coated fabrics should either be rinsed under running water and then washed carefully, or they can be taken outside and beaten to remove the ash.
- Soiled clothing will require extra detergent. Wash small loads of clothing, using plenty of water so the clothes will have room to move freely in the water. Brush or shake clothes before washing.
- Moisten thick ash deposits on hard floors and place in bags (avoid sweeping dry ash).
- Use a damp mop or wet cloth to clean hard floors.

- For several months after an ash fall, filters may need replacing often. Air conditioner and furnace filters need careful attention. Clean refrigerator air intakes. Clean any surface that may blow air and recirculate the ash. Stove fans and vents should be cleaned thoroughly.

### **Don't**

- Do not use floor sweepers with side brushes to clear aisles and floors because they may re-entrain dust particles into the air.
- Do not clean by blowing with compressed air or dry sweeping as ash will be remobilized into the air.
- Do not use fans or electric clothes dryers which might remobilize ash.

### **Recommendations for cleaning motors**

- Turn off electric motors and machinery before cleaning them. Throw the motor switch as well as the main circuit breakers.
- Clean the electrical equipment using air pressure of 30 psi or less to avoid getting a sandblast effect on delicate parts. Vacuum, where possible, and change filter bags often. Avoid damaging surfaces by rubbing or brushing them. Do not blow ash into places that should be kept clean, and always follow manufacturer's recommendations for cleaning equipment operated under dusty conditions. Increase maintenance servicing as recommended.
- Watch for electric shocks when operating ashy and dusty equipment. Be alert to the possibility of overheating and fires.

### **Ash Disposal**

Removing, transporting, and disposing volcanic ash is a dirty, time-consuming, and costly challenge. Coordinated action by the public and by organizations can significantly lower costs and speed up the time it takes to remove most of the ash. The fall of a few millimeters of ash on an urban community will likely result in the need for collection and disposal of large quantities of material. Proper disposal sites are needed quickly so that the (1) ash does not have to be moved a second or third time; and (2) cleanup operations can begin immediately.

The time and effort required to remove and dispose ash depends on the depth and aerial extent of the deposits, especially in urban and populated areas, and the availability of machinery (for example, from areas outside the zone of ash fall) to clean it up. Cleanup operations can take weeks to months to complete.

Ash removed from inside buildings and homes should be disposed in accordance to community plans and directions (for example, preparing it for pick up by clean-up crews as part of neighborhood cleanup activities). It may be advisable to request that people separate volcanic ash from normal garbage for collection or disposal at a designated location—mixing ash with normal garbage can result in damage to collection vehicles

and take up space in landfills. Small amounts of ash from vacuum cleaners have been disposed successively in household gardens and lawns.