SECTION 2 (C)

FACT SHEET

VOLCANIC ERUPTIONS

FACT SHEET
VOLCANIC ERUPTIONS

WHAT ARE THEY?

The term VOLCANO signifies a mountain or hill with an opening or vent from which gaseous liquid or solid materials from the earth's interior are ejected. The term is also used for mountains, hills, or craters formed by the accumulation or removal of materials during past volcanic events even if no active vent is presently existing.

WHAT IS A VOLCANIC ERUPTION?

VOLCANIC ERUPTION is the process wherein volcanic materials such as lava, fragmented rocks or gases are emitted or ejected through a crater, vent or fissure on to the earth's surface to form new deposits.

WHERE ARE THE VOLCANOES IN THE CARIBBEAN?

The Caribbean has several volcanoes distributed all over the Region. Those that been recorded as having erupted are classified as active volcanoes. The others are classified as inactive.

EXPECTED HAZARDS

There are several processes that occur on the slopes of the volcano that pose hazards to man and his environment. Most of the hazards are directly caused by volcanic eruptions.

Blasts and projectiles - large projectiles can damage buildings; if these are hot they can start fires.

Mud flows (lahars) - frequently accompany volcanic eruptions and can be lethal. Lakes can mix with volcanic rock and debris to form a near-solid flow which engulfs all in its path.

Pyroclastic flows - mixtures of hot gases, ash, fine pumice and rocks; danger lies in the density and temperature of the ash and rock fragments. Hazards include body surface burns, inhalation injuries and asphyxia.

Gases - these may be asphyxiants which are concentrated near the volcanic crater or fissure or respiratory irritants which are more dispersed and can be harmful at lower concentrations.

Lava Flows - very dangerous.

Local Earthquakes - possible loss of human life and property.

Tsunamis - occurrence unpredictable and can destroy coast-lines.

LIKELY IMPACT

The effects that can be expected from these are the damage and injury or death by impact, incineration, burial and bulldozing. Another hazard that is also directly related to volcanic eruption is the fall of volcanic materials ejected from the crater.

EMERGENCY ACTION

Volcanic eruptions are preceded by signs, some of which are not detected by instruments, nor observed by volcanologists.

The following are some points that should be taken into account to effectively respond to a volcanic eruption:

Fact Sheet - Volcanic Eruptions

Before the Eruption

Community Preparation

* Demarkation and evacuation of areas of risk.
* Formulation of and familiarization with search and rescue plans.
* Preparation of hospital emergency plans to cope with large influx of patients with burns, lung damage and trauma.
* Identification of facilities to collect and analyse ash for toxic elements and drinking water quality.
* Facilities and equipment for monitoring air.
* Plans for procurement of emergency supplies.
* Report any and all unusual physical changes around volcanoes to the Seismic Research Unit, e.g. the drying up of vegetation, rumbling sounds, earthquakes, landslides and other possible abnormalities.

During the Eruption

* Pay attention to Warnings, which would include evacuation notices and escape from area as quickly as possible.
* Listen to the radio for information and advice.
* Find shelter, but **NOT** in a building with low-pitched or flat roof, if heavy ash is falling.
* Avoid basements and closed spaces where gases may accumulate.
* Wear protective clothing over head and body if you have to move in an ash shower.
* Breathe through a handkerchief.
* Always carry a torch, even during the daytime.

MITIGATION MEASURES

* Establish permanent danger zones around the summit of active volcanoes.
* Educate population about Volcano risks.
* Improve Warning and Evacuation Systems.
* Identify resources needed for emergency response.

VOLCANO RISK ZONES AND RESTRICTIONS

On the constantly active volcanoes whose slopes are densely populated risk zones had been identified based mainly on their distances from the volcano's crater. These risk zones are generally identified as follows:

PERMANENT DANGER ZONE

DESCRIPTION - 4 to 6 km radius circle

RESTRICTIONS

Permanent habitation not allowed, people's access limited, off limits to public when eruption is imminent or ongoing.

PHASE I - DANGER AREA

DESCRIPTION - 2 km wide band around a Permanent Zone Area

RESTRICTIONS

Limited habitation allowed, Permanent Danger Zone evacuation measures implemented during most eruptions, establishment of heavy industries and populated facilities are discouraged, access may be limited, depending on intensity and character of eruption.

PHASE II - DANGER AREA

DESCRIPTION - 2 km wide band around a Phase I Danger Area.

RESTRICTIONS

Habitation allowed, evacuation may be recommended on selected sites, depending on intensity and character of eruption.

PHASE III - DANGER AREA

DESCRIPTION - Size and site dictated

RESTRICTIONS

Evacuation and access limited by expected eruptions according to intensity and character of eruption.

VOLCANO BULLETINS

The Seismic Research Unit regularly issues volcano bulletins for monitored active volcanoes. These bulletins are meant to be inputs in the formulation of disaster response plans for volcanic eruptions and associated hazards. People residing on the slopes of the active volcanoes are also expected to be well informed of the current conditions of the volcano, most particularly whenever eruptions are expected.

The bulletins contain a description of the day's record of volcanological observations, including the number and magnitude of earthquakes recorded, ground deformation conditions, temperatures, volcanic lake conditions, steaming intensity and other data gathered from instruments and observations of the volcano.

One portion of the Volcano Bulletin describes the current evaluation of the volcano, based on volcano monitoring information. Based on these conditions evaluations, precautionary instructions are formulated, particularly if the evaluation indicates some degree of abnormality associated with the condition of the volcano. The following criteria are used in evaluating the conditions of the volcanoes.

STATUS OF THE VOLCANO

NORMAL - All the monitored parameters are within the levels exhibited during non-eruptive (normal) periods, no eruption may be expected in the near future.

ABNORMAL - Some of the monitored parameters had recently deviated from the normal patterns. The abnormality may persist for some time and may deteriorate and eventually lead to an eruption within the next few months.

ALARMING - Monitored parameters indicate conditions that resemble recorded precursors, the abnormality may lead to an eruption in the near future, probably within weeks or a few months.

CRITICAL - Monitored parameters indicate pre-eruptive conditions; the volcano's condition may lead to an eruption in the immediate future, probably within several weeks.

ERUPTION IMMINENT - The volcano's condition indicate a high probability for an eruption to occur in the immediate future, probably within a few weeks or days.

ERUPTIVE - The volcano had entered an eruptive condition.

SECTION 2 (D)

FACT SHEET

FLOODS

FACT SHEET
FLOODS

DEFINITION

Abnormal progressive rise in the water level of streams or rivers which may result in overflowing.

FLASH FLOOD

A sudden and extreme volume of water which flows rapidly and causes inundation and which, because of its nature, is difficult to forecast.

CAUSES OF FLOODS

* Heavy Rainfall
* Dam or levee failures
* Torrential rains from cyclones
* Tsunamis
* Storm Surges
* Burst water mains

TYPES OF FLOODS

* Flash Floods
* River Floods
* Coastal Floods

LEVELS OF FLOODING

Inundations due to flooding vary in cause and severity can be categorized as follows:-

Minor Flooding

* Due to the accumulation of excessive surface runoff
* Flood waters consigned to the flood plain immediately along a river/channel or in random low lying and topographically depressed areas
* Flooding is relatively shallow and there is no perceptive flow of water as when inundation is rapidly spreading to adjacent areas

Major Flooding

* Due to overflowing of rivers and lakes, unexpected and serious breaks in dikes, levees and other protective structures or uncontrolled releases of dam water
* Coverage of a wide continuous area and rapid spreading to adjacent areas of relatively lower elevation
* Flooding is relatively deep in most parts of the flood-stricken areas. Currents of flowing flood water will be swift as the flood spreads to other areas.

LIKELY IMPACT

Flood waters can destroy infrastructure, particularly those at ground level. Crops and livestock can also be destroyed and considerable water damage to critical assets will occur in the path of flood waters. Many persons may be killed especially when flash floods occur but the injuries are few. Food supply may become an issue.

FLOOD WATCH

Designation of the period during which flood monitoring, forecasting and flood warnings are carried out.

The principal activities are:

* Flood monitoring.
* Data collection and processing.
* Assessment of probability of flooding.
* Dissemination of information to public.

PHASES OF FLOOD WATCH

Alert Period of intense data collection, monitoring and assessment, when the possibility of flooding is present, but its probability is relatively low.

Warning Issued when indications show that water levels will exceed the alert level within 24 hours. The Flood Watch converts to flood warning and the appropriate Advisories are issued.

A Flood Watch is activated and terminated in accordance with the established conditions and criteria developed by National Disaster Organisations.

EMERGENCY ACTION

Official announcements are issued regularly before, during and after the occurrence of floods. These are intended to appraise the public in the affected area of the present and projected flood situation.

FLOOD ADVISORY

Content of such bulletins include:

* Present and expected situation of the meteorological cause of flooding.
* Present and forecasted hydrological situation.
* Areas likely to be affected.
* Time and severity of flooding.
* Precautionary measures recommended.
* Routine announcement of next bulletin.
* Safety precautions to be taken before the flood, when Advisories are issued and during and after the flood

Before the Flood

* Know the flood warning system in your community and ensure that your family knows the warnings.
* Learn all you can about flooding.
* Monitor weather conditions.
* Keep on hand material like lumber, plywood, nails, ropes, wires, plastic sheeting, sandbags, etc.
* Keep a portable transistor radio with spare batteries and emergency equipment.
* Store all chemicals away from flood waters.
* Store livestock feed and supplies above expected water levels.

During The Warning

* Listen to radio for emergency instructions.
* Watch for rapidly rising water.
* Store drinking water in sealed plastic containers, as water service may be interrupted.
* Move household items to higher levels.
* Get livestock to higher ground.
* Evacuate if necessary when it is safe to do so, don't wait hoping to save your possessions, move quickly.
* Turn off electricity at the main switch before evacuating

During the Flood

* Avoid areas subject to flash flooding.
* Don't attempt to cross rivers or flowing streams where water is above the knees.
* Beware of water-covered roads and bridges.

Livestock Protection

Animals can swim well. Don't leave them in confined areas or pens. Open gates so animals can escape.

After the Flood

* Re-enter buildings with caution. Use flashlights, not lanterns or torches as flammables may be inside.
* Be alert for fire hazards such as broken electrical wires.
* If the building has been under water, do not switch on the main, wait for professional assistance. Never touch electrical switches while wet or standing in water.
* Don't use appliances or equipment until they have been cleaned, dried and thoroughly checked for damage.
* Report broken utility lines (electricity, water, gas and telephone) to the appropriate authorities.
* Boil all water and don't eat left-over food until it is checked for contamination
* Keep away from disaster areas as your presence may hamper rescue efforts

MITIGATION MEASURES

Flood Mitigation Measures may be divided into three (3) main areas:

* Control over the river.
* Control over the land.
* Other measures.

CONTROL OVER THE RIVER

Reliance is mainly on the physical alteration to the channel, flood plain or watershed to control the river. Measures include:

* **Dams and Reservoirs** built on main streams or tributaries that store excessive water and releases it gradually after the threat has passed.
* **Levees or Floodwalls** confine flood waters to a floodway, thereby reducing flood damage.
* **Channel Improvements** which include:
    1. Straightening to remove undesirable bendways.
    2. Deepening and widening to increase size of waterway.
    3. Clearing to remove brush, trees and other obstructions.
    4. Lining with concrete to increase effi ciency.
* Watershed Treatment which renders the soil more absorbent of excessive rainfall until flood heights have receded.

    Measures include:
    * Crop rotation.
    * Construction of terrace.
    * Contour strip cropping.
    * Selective planting and reforestation.

CONTROL OVER THE LAND

Measures are embodied in the following Land Use Policies:

* **Designated floodways and encroachment** lines are the lateral boundaries of the floodway where no construction or land filling should be permitted.
* **Zoning** is a legal tool used by governments to control development.
* **Subdivision Regulations** specify the manner in which land may be divided. Typical provisions show the extent of the flood plain on maps. Floodway limits or encroachment lines prohibit filling in channels and floodways that restrict flow and require that each lot contain a building site with an elevation above the flood level.
* **Building Codes** are standards for construction of buildings and other structures and if enforced can reduce damages to buildings in flood-prone areas.

Some requirements include:

* Establish basement elevations and first floor elevations consistent with potential floods levels.
* Require structural strength to withstand water pressure or high velocity of flowing water.
* Prohibit equipment that might be hazardous to life when submerged.
* Prevent flotation of buildings by requiring proper anchorage.

Photograph showing the effects of the 1981 flooding in Barbados

OTHER MEASURES

These include flood proofing, flood forecasting, warning and evacuation systems.

* **Flood Proofing** is a combination of structural changes and adjustment to properties which can be used in new or existing construction. Action include, seepage control, protective coverings, elevation or raising anchorage and underpinning.
* **Flood Forecasting** is reliable, accurate and timely forecasting of floods coupled with timely evacuation to save lives and reduce property losses.
* **Temporary Evacuation** removes persons and property from the path of flood waters.
* **Permanent Evacuation** removes an affected population from areas subject to inundation. This involves the acquisition of lands and the removal of improvements. The acquired lands can be used for agriculture, parks or other purposes that would not interfere with flood flows or result in material damage.
* **Flood Insurance** assists by compensating for flood damage but insurance rates should realistically reflect the flood risk in order to avoid encouragement of improper development of flood plains.

GLOSSARY

BUILDING CODES are a set of regulations adopted by Government to set standards for the construction of buildings and other structures.

FLASH FLOOD is a sudden and extreme volume of water which flows rapidly and causes inundation and which because of its nature, is difficult to forecast.

FLOOD is an abnormal progressive rise in the water level of streams or rivers which may result in overflowing.

FLOOD PROOFING is a combination of structural changes and adjustments to properties subject to flooding primarily for the reduction or elimination of flood damages.

LEVEES are earthen embankments used to blockade or confine floodwater.

SUBDIVISION is a tract of land divided into lots for the purpose of sale or building development.

WATERSHED TREATMENT is the treatment of land to render the soil more capable of absorbing and retaining some of the excessive rainfall.

ZONING is the legal tool that is used to implement and enforce the detailed plans resulting from the planning programme.