Lava flows may surge or back up due to a constriction downflow and flow out of windows or entrances. Often this lava leaves a lining deposit around the edge as evidence of its passing, and may even deposit lava balls that were being carried along, around the edges of the entrance or window. A different sort of upwelling can occur from floors of tubes when segregations boil out of the semi-solid floor. Sometimes these resemble miniature volcanoes or even lava roses.

In the photo below, lava has upwelled from a lower level through a window and sealed the window shut as it cooled. In the lower photo are some features upwelled on a floor.
Lava balls are formed from pieces of *breakdown* that float and roll along in a stream of moving lava, accreting mass as they move. It is much like a snowball rolling downhill and growing larger as more snow sticks to it. Lava balls tend to roll along until being wedged at a constriction, or often, are stuck to a ceiling during a surge in the flow. They may get quite large, as shown in the second photo. Sometimes they are lifted by *upwelling lava* through a *window* or *skylight* and are deposited around the edges before the lava drains back in, as in the third photo.
While many lava tubes consist primarily of a single conduit, it is not uncommon to have areas where passages branch and rejoin. Braiding occurs most actively near the leading portions of lava flows, and occurs because accretion of cooling lava occurs faster than downcutting or erosion. Hence, braiding occurs more often on the lower-gradient areas of the tube, that is, where the surface that the lava is flowing over is less steep. Unlike the case for limestone caves, braided mazes tend to reconnect rather than diverging into broad dendritic patterns.
All of the lava tube features shown in the other sections of the Virtual Lava Tube are primary features, which formed from the molten lava while the cave was actively forming or in its cooling phase. But during or after a cave’s cooling phase, minerals may deposit as crusts, crystals, or as more familiar speleothems like stalactites and stalagmites. Deposits can occur in two major ways. As the cave initially cools, minerals can condense from gaseous vapors, typically forming crusts or small crystals. The deposits in the first two photos probably formed that way. After the cave has formed, water from rainfall begins to seep in through the porous lava. Initially this will dissolve away crusts formed from gaseous vapors, as we noted when visiting caves less than two years old on the flanks of Kilauea. But water passing through the rock may slowly leach out minerals that can be re-deposited inside the cave. The most common minerals in lava tubes tend to be sulfate minerals such as gypsum (calcium sulfate) and thenardite (sodium sulfate), but calcite (calcium carbonate) is common as well. Unlike in limestone caves, dissolved minerals are generally deposited from simple evaporation rather than off-gassing of carbon dioxide, the mechanism behind most dripstone deposits in solution caves. The third photo shows evaporitive deposits.
Lava tubes can be black as night and totally devoid of any color. Mineral deposits can coat black lava and provide color, usually as white or yellowish crusts. But lava itself can take on many colors in lava tubes, sometimes with spectacular results as seen in the accompanying photos. The color it takes depends on both its chemical composition and oxidation state. Iron compounds will turn red on exposure to air, and red lavas are often found around skylights or other openings that bring fresh air into the tube. Green lava has a high pyroxene or olivine content.
Lava tubes may form several levels, one formed below another. An opening between levels is a window. Lower levels, usually the last part of the tube to be active, may overflow into upper levels through windows, leaving a deposit along the edges. This upwelled lava may leave just a thin skin or lining around the window, or may seal it completely.
Organic deposits may coat the walls of tubes, usually taking the form of a soft, gooey layer that is easily rubbed off the wall but sometimes tightly adhering to the wall. These may range in color from white to tan to lemon yellow to golden to pink. Often these layers have water droplets adhering to them, giving a sparkly appearance to the cave passage. The droplets appear to be associated with a hydrophobic phase in the life of the bacteria in the Actinomycetales order, which account for some species of tube slime. Bacteria in the Actinomycetales have been the source of many of our antibiotics and some convert atmospheric nitrogen to forms that other organisms can use to obtain nitrogen. A variety of other orders of bacteria have been found in tube slime, and scientists are still investigating the potential for finding new species. Organisms can also be responsible for mineral deposits on the walls of caves, especially ones containing phosphates, chlorides, sulfates, and nitrates.
Lava tube passages tend to be fairly close to the surface, generally with less than 20 feet of overburden and sometimes less than a foot!

Trees growing above the passage will often send down roots in search of water. In Hawaii, it is the ohia ohelu tree whose roots are most common, often forming a feathery jungle in the cave passage.

When exploring the caves, care must be taken not to damage the roots. Not only is that not good for the trees, but the roots themselves are host to a complex and fragile community of cave-adapted insect life. Often these insects are endemic species found in only a few caves in an area.

Doña Otilia Malargüe
Mendoza - Argentina
Frothing, turbulent lava flowing through a tube, or breakdown falling into molten lava, can splash stalactites on the ceiling, coating them with additional lava. The ends of such stalactites are likely to be irregular, as dripping lava hardens. In the first photo, a later flow of red lava has splashed the pre-existing stalactites. More commonly, splash stalactites can be a primary form, creating stalactites where none had existed before, as in the lower photo.
Tubular lava stalactites are common in many lava tubes and have a concentric tubular shape, are (initially) hollow, and range in diameter from .4 to 1 cm. They are formed by "segregations extruded by expanding gas into cave passages" (Allred & Allred, 1998) as the lava tube cools. In the cooling walls of the cave, some minerals solidify first, forming a coarse, porous matrix. Boiling causes gases to force the remaining segregated liquid material out of the walls, forming tubular lava stalactites. Growth rings are found on the skin of the stalactites, each ring formed from dripping. Considerable material may be carried out of the stalactite and pile up on the floor beneath, forming a drip stalagmite.

In the first photo a single stalactite shows a bit of vermiform character, but doesn't full grade into a tubular lava helictite. The middle photo shows a stalactite that deflated when either the hot gases filling it suddenly escaped, or draining of liquid lava caused it to collapse. The lower photo shows a group of stalactites that have merged with their respective drip stalagmites to form the analogy of a column as found in limestone caves.
As successive flows pass through an established tube, they may accrete material on the walls in thin layers called linings. Sometimes up to a dozen distinct layers can be visible where a large chunk of wall has fallen. Individual layers may also peel off to become thin plates of breakdown, typified by one surface being smooth and perhaps showing a glaze while the former inside surface tends to be rougher and frothier.

**Top photo:** Park service ranger shines his light on a single layer of lining that is separating from the wall.

**Middle photo:** The left-hand wall shows two distinct lines demarcating the top edges of linings accreted to the wall. Note that they tend to be irregular as they typically form from flowing lava, which splashes about, rather than from a lava lake, which would produce a straight line at the top. A third lining near floor level has become partly detached from the wall.

**Bottom photo:** If a subsequent flow completely fills a passage, the lining formed by the newly accreted material may adhere to the ceiling as well as the walls and floor.
Sometimes the amount of lava flowing into an active tube suddenly surges, or is blocked by a sudden breakdown, and backs up through windows into upper levels and side passages, where it may cool and fill the passage completely. Often it will drain back down, leaving a new layer of material. It may then appear that the lava in a down-sloping passage was actually moving in the wrong direction, which it was for a time!
A lava rose is a rare drip formation found on floors, with a rose-like appearance. It is a form of drip stalagmite, but instead of driblets, sheets of molten lava fall. Roses may also form, instead, from upwelled lava boiling up out of a partially solidified floor. Boiling of cooling (segregated) lava is probably what propels the upwelling.