

## LAVA MOUNDS PERIPHERAL TO THE KING'S BOWL ON THE GREAT RIFT, IDAHO

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Approximately 100 lava mounds are located in a discontinuous ring around King's Bowl, a prominent volcanic vent on the Great Rift in southern Idaho. King's Bowl is ovoid in plan and about 90 m in length measured along the Great Rift and about 25 m across at its maximum width. The ring of mounds extends nearly 460 m north and south of King's Bowl, up to 520 m east of the vent and 360 m west of King's Bowl. The mounds are of a variety of irregular subrounded outlines, many of which show streamlining outward away from King's Bowl. The mounds are also of a variety of sizes with a minimum dimension of 7.5 m across and a maximum dimension ranging from 12 - 24 m. The average height of the mounds is 3 - 4.5 m.

The typical lava mound consists of a .3 - .6 m high wall of stacked or irregularly oriented plates of basalt from .3 - 1 m across and from 2.5 - 7.5 cm thick. These walls or ramparts are usually discontinuous on that portion of the mound facing away from King's Bowl and give the impression of having been deposited by material moving out and away from the central area. Some mounds lack platy ramparts and instead show low walls of rubbly or scoriaceous basalt. Flow lines and well-defined lava channels are apparent around some of the mounds and almost without exception, the mounds are surrounded at their bases by massive basalt plates which dip away from the mounds.

The lava mounds which are locally called the "Ring of Fire", are apparently related to a lava lake which existed in the location prior to the explosive event which resulted in the King's Bowl crater. Not all of the mounds have similar physical features however and it is believed that although they are all genetically related to a source vent at King's Bowl, some of the lava mounds had slightly different histories. Levelling of the mounds established that they were all of nearly the same elevation (average elevation: 1509-1510 m). The distribution, the general morphology and details of minor structures as well as the near uniformity in elevation all suggest that most of the lava mounds were parts of a levee of basalt that retained the lava lake which collected from lava flowing from a vent in the King's Bowl region. The lava erupted from the vent and quickly crusted over. The crust was soon fractured into plates by continuing activity in the underlying molten lava. The general convection of the molten lava probably coupled with withdrawals and resurgence defined the ultimate position of the levee. This levee was irregular in outline with protrusions toward the lake and reentrants away from the lake. However the hydrostatic head of the lava controlled the level of the levee. It is interpreted that either a final resurgence of lava from the vent caused the lava to rise and start to overflow the levee resulting in continuing erosion through the wall or that pressure generated against the wall by resurgence of the lava caused breakthroughs at weak points along the levee. Such points could be positioned at points of reentrants while points of strength (those which were to remain as the mounds) could relate to the convex buttresses in the irregular wall. Whatever the cause, outflow did take place as is clearly seen in the preserved streamlining around some of the mounds. As noted, the mounds are all of similar elevation. However there is a group of mounds arrayed along the east side of the Great Rift which are all of a consistently higher elevation of 1.2-1.5 m in excess of the mean elevation. This suggests that the entire process was repeated and that a lava lake existed at an earlier time at a somewhat higher elevation. The process of eruption, retention, breakthrough and outflow was no doubt short-lived and preceded the King's Bowl event.

Subsequent to the lava lake (or lakes) a phreatic eruption took place from the King's Bowl. This was a violent explosive eruption as evidenced by the field of block ejecta which is especially well-arrayed on the west side of King's Bowl. Projectiles from King's Bowl have repeatedly broken through the lava lake crustal plates as well as through squeeze ups on the crustal surface which forced out at a late stage in the lava lake activity. Ash was also ejected from King's Bowl and this is found primarily along the east side of the crater indicating a prevailing wind from the west at the time of eruption. Ash fills the central depression in many of the mounds on the east side of the Rift.

The King's Bowl itself is believed to be only partially the result of ejection of solid material. The explosive event certainly disrupted rock in the vicinity of the vent and much was thrown out. However withdrawal and subsidence of activity in the vent no doubt allowed gravity adjustment as well and much of the crater as it exists today is believed to be the result of collapse.