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VOLCANIC HAZARDS IN THE STIKINE REGION OF NORTHWESTERN BRITISH COLUMBIA

J.G. Souther

The recent eruption of Mt. St. Helens has not only aroused public awareness of volcanic hazards, it has also led to concern for the safety of communities and engineering works in the young volcanic regions of western Canada. The focus of much of this concern is Mt. Edziza which, because of its status as a Provincial Volcanic Park, has received considerable publicity and is generally regarded to be dormant rather than extinct. It is also near the proposed locations of several new hydroelectric projects (Fig. 1) which has led to speculation as to the impact a future eruption might have on these installations. This preliminary report is being released in response to numerous requests prompted by this current atmosphere of concern and speculation.

Mt. Edziza is one of the most recently active volcanoes in Canada, having erupted several times within the last two thousand years. It is also one of the largest and most complex volcanoes in the Stikine Volcanic Belt, a group of at least 50 Quaternary volcanoes that extend from the Aiyansh Flow, near Terrace, north to the Yukon border. At least two centres within this belt have erupted within the last 250 years and the possibility of future eruptions, either from Mt. Edziza itself or elsewhere in the Stikine Volcanic Belt cannot be ruled out. The impact of such an event, should it occur, will depend on its location and on the type of material erupted.

Although there is considerable scatter of small cones throughout the belt, major eruptions during the past several million years have been confined to three general areas: The Mt. Edziza-Spectrum Range Complex; the Level Mountain Complex; the Lower Iskut Valley. It is highly probable that any future eruption of sufficient magnitude to cause concern would also occur within one of these three locations.

Basalt and trachybasalt are by far the most abundant materials erupted by volcanoes of the Stikine Belt. They comprise all of the lava in the Lower Iskut Valley; about 80% of the Mt. Edziza pile; and over 90% of the Level Mountain pile. Thus basalt or trachybasalt are the most likely products of any future activity. Because of their low viscosity these types of materials tend to erupt passively, forming slow-moving lava flows that are channelled into existing valleys. Fire fountaining around the vent may produce a cinder cone and a small amount of airborne tephra may deposit a thin layer of ash on the lee side of the cone. Measurable thicknesses of ash from existing cones on Mt. Edziza extend only a few kilometres from their sources. The most serious impact of such an eruption would probably arise from disruption of the local drainage system, formation of unstable lava dams, or excessive melting of glacier ice, any of which could lead to downstream flooding. The Stikine sites (Tanzilla and Site Z) are approximately 40 km from the summit of Mt. Edziza and separated from it by the intervening Klastline Plateau and the deep valley of Klastline River. During its 10 million year history none of the lava from Mt. Edziza has flowed beyond this valley and it is inconceivable that any future eruption could generate a sufficient volume of lava to crest the divide between the Klastline and Stikine rivers. The Klastline may again, as it has in the past, be dammed by lava flows. But, since the Klastline enters the Stikine approximately 7 km downstream from the proposed Tanzilla powerhouse, flooding resulting from lava dams on the Klastline River would not affect the hydroelectric installations.

Airborne ash from a future eruption would probably be carried east by the prevailing winds and find its way into the upper reservoir. However, this would certainly settle out in the upper, holding reservoir behind Site Z, and little, if any, would reach the Tanzilla reservoir and powerhouse.

The Iskut Canyon dam (actually two dams) and powerhouse are located near the confluence of Forrest Kerr Creek and Iskut River. A small pyroclastic cone stands about 4 km south of this junction and lava flows from it extend into Iskut Valley both above and below the proposed site. Should a similar event occur in the same location after construction it could severely damage the installations. However there is evidence that the flows issued slowly over a period of weeks which would have provided time for the orderly lowering of reservoir levels. Moreover, none of the other small basaltic eruption centres in the Stikine Belt shows evidence of reactivation. Thus, it is unlikely that the conduit system of this small cone is still open. If magma is still present at depth it is probably no more likely to choose this path to the surface in preference to any other.

The present level of knowledge concerning the history and nature of Quaternary volcanism in the Stikine region is well advanced. In addition British Columbia Hydro geological consultants are supplementing the published data with detailed site-specific studies, including the installation and monitoring of a local seismic array capable of receiving and locating microearthquakes. During the summer of 1981 three new stations will be installed: Dease Lake, Bob Quinn Lake and Muncho Lake. Initially data from this array will serve as a base-line study to determine the level of seismic activity in the region. If it should identify a swarm from a point source the source itself will be instrumented and monitored.

A more comprehensive assessment of volcanic hazards in the Stikine area is in preparation.

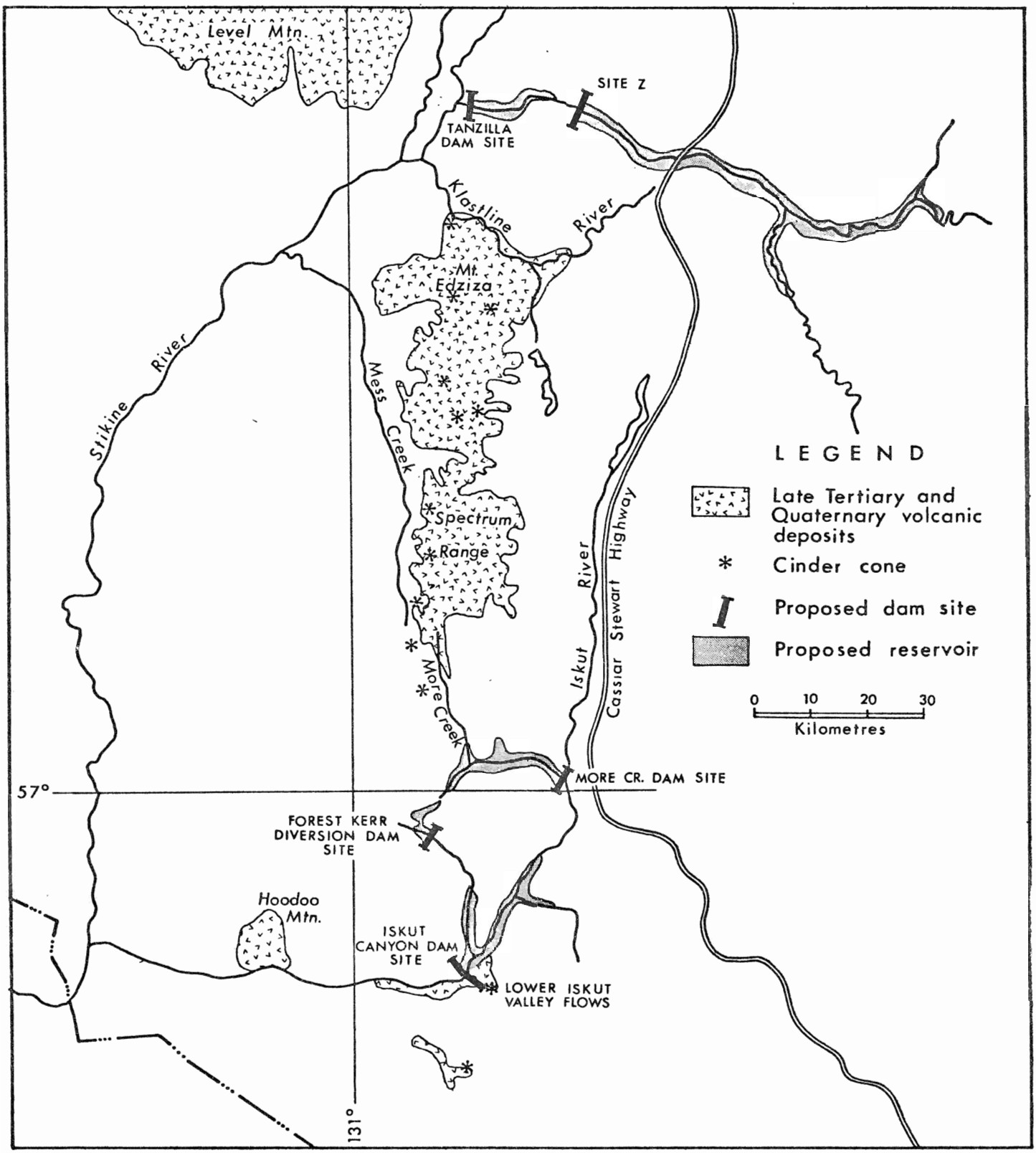

Figure 1. Sketch map showing relationship of young volcanic deposits to proposed hydroelectric projects.