AN ABSTRACT OF THE THESIS OF Moinoddin Murtuzamiya Kadri for the Master of Science in Geology presented October 6, 1982.

Title: Structure and influence of the Tillamook uplift on the stratigraphy of the Mist area, Oregon.

APPROVED BY MEMBERS OF THE THESIS COMMITTEE:

Gilbert T. Benson, Chairman

Robert O. Van Atta

Marvin H. Beeson

Around the hamlet of Mist, in Columbia County, northwestern Oregon, four formations ranging in age from late Eocene to middle Miocene are exposed. The late Eocene Keasey Formation consists of gray, tuffaceous, concretionary mudstone, siltstone and minor sandstone. The unstable and complex environment of deposition is indicated by lutokinesis and wide, shallow submarine channels.

Deltaic deposits of the Pittsburg Bluff Formation
unconformably overlie the Keasey Formation. The lower laminated member (informal) of the Pittsburg Bluff Formation consists of finely laminated mudstone, and interlayered, arkosic sandstone. The upper siltstone member (informal) consists of bioturbated, carbonaceous siltstone and sandstone. It crops out in an arcuate belt generally paralleling the Nehalem River, and thins rapidly towards the west.

The middle Miocene Astoria Formation unconformably overlies the Pittsburg Bluff and Keasey Formations, and consists of poorly consolidated, lithic arkosic to quartzose sandstone and siltstone. Primary structure is well developed in the Astoria Formation; micro cross-bedding and trough cross-bedding are common in the sandstone. The Columbia River Basalt Group is represented by the Grande Ronde and Frenchman Springs geochemical types. Some of the basalt clasts in the conglomerates in the Astoria Formation were derived from Columbia River basalt flows.

Fifty three sedimentary samples were analyzed for their minor and trace element concentrations utilizing instrumental neutron activation analysis. Concentrations of Na, K, La, Sm and Sc, and their ratios appear to establish significant trends. The data suggest a major break from a granitic-metamorphic provenance and a volcanic component dominated provenance between the
Cowlitz and Keasey Formations respectively. The provenance of the Astoria Formation indicates the presence of flood basalts.

Complex faulting along northeast-southwest, and younger northwest-southeast trends primarily involves vertical movements. Exposed faults have steep dips, narrow shear zones, very little drag and form horsts and grabens. Pi-S diagrams of the Keasey, Pittsburg Bluff and Scappoose Formations indicate near horizontal to northerly or northeasterly dips. Northeast-trending, horizontal Beta axes in the Pittsburg Bluff (siltstone member) and Scappoose Formations parallel the axis of the Tillamook arch. The northwest-trending Beta axis of the Scappoose Formation probably reflects the latest structural grain of the area. Near horizontal dips of the strata, especially those of the post-Cowlitz age, the high angle faults, and the horizontal Beta axes probably preclude uplift involving extensive compression and thrusting. The post-Keasey uplift produced an unconformity and restricted the deposition of coarser lithofacies of the Pittsburg Bluff Formation to the east and around the nose of the plunging axis of the Tillamook arch. Post-Keasey but pre-Astoria uplift along the axis of Tillamook arch and Willapa Hills upwarp produced the east-west trending Columbia River synclinal trough. The Astoria Formation and the Columbia River basalt flows are depositionally confined to this
structural downwarp. Continuity in the outcrop pattern of the middle Tertiary units perhaps precludes any large scale strike-slip offset.