University of Victoria | Graduate Studies

Notice of the Final Oral Examination
for the Degree of Master of Applied Science

of

KAIFENG XU

B.ASc (University of Regina, 2018)

"Spatial and Temporal Analysis of the Distribution of Bacterial Contamination in Nearshore Areas of Southern Vancouver Island"

Department of Mechanical Engineering

Thursday, September 6, 2018
11:00 A.M.
Engineering Office Wing
Room 430

Supervisory Committee:
Dr. Caterina Valeo, Department of Mechanical Engineering, University of Victoria (Supervisor)
Dr. Rustom Bhiladvala, Department of Mechanical Engineering, UVic (Member)

External Examiner:
Dr. Jianxun He, Department of Civil Engineering, UVic

Chair of Oral Examination:
Dr. Terry Prowse, Department of Geography, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

This research conducts a spatial and temporal analysis of the distribution of fecal coliform throughout the Capital Regional District (CRD) of southern Vancouver Island. The research is based on 17 years of historical data of stormwater samplings from 1995 to 2011 in the nearshore region. ArcGIS is used to map the fecal coliform data collected within and adjacent to nearshore areas to identify peaks above a regulated threshold. Heavily polluted areas are in Victoria downtown, Esquimalt and the southeastern shore of Oak Bay. Land-use data and drainage patterns are used to determine relationships between fecal coliform levels and land-use by considering relevant, temporally dependent factors. Temperature is positively correlated with FC level and precipitation is negatively correlated. The residential land use is identified as the main source of bacterial contamination. This analysis leads to a regression model that indicates two peaks (July and October) of FC level occur in a 12-month period and positively related to minimum temperature and cloud cover ratio.