Environmental Geology Final Lab Portfolio Contents:
Final Lab Portfolio Due Thursday June 10, 2004 4:00 PM

In the order listed, include the following lab and writing exercises in a neat package:

Lab Work

Groundwater Flow Problem Set
Print Outs from Surfer Tutorial Exercise (Climate Problem, DEM's)
Mtn Fir Lab Part A - Well Log Interpretation
Mtn Fir Lab Part B - Site Project
Part 1 of Fluvial Hazards: In-Class Exercise (West Virginia Dam-Burst Problem)

EXTRA CREDIT – Part 2 of Fluvial Hazards: In-Class Exercise (Santa Barbara Flood Analysis)

Environmental Geology Spring 2004 Final Exam Study Guide

The Final Exam will be in 2 parts, the lab skills portion will be open book. You will be able to use your notes, conversion charts, answer keys, etc. to work on lab-style problems. Make sure you go over the answer keys before the exam, if you are still uncertain how to solve the problems, see me ASAP. The second part of the exam will be closed book, and consist of long-answer essay questions, short-answer terminology, perhaps some true/false.

Key Words

Landfills / Coffin Butte

landfill
solid waste
liquid waste
municipal waste
residual waste
hazardous waste
industrial waste
composting
sludge ponds
injection wells
leachate
soil contamination
water contamination
seepage
surface runoff
sediment erosion
erosion control
air emissions
fugitive dust
methane generation
anerobic bacterial decay
methane
groundwater monitoring system
upgradient
downgradient
liner system
double liner system
geomembrane
geotextile
impermeable barrier
leachate containment
methane collection system
fugitive dust control
air pollution monitoring
vector control
erosion and sedimentation
borrow
fill
landfill closure
remedial action plan
erosion / sedimentation pond,
landfill closure,
daily cover,
disposal cell,
buffer zone,
active life,
fault / seismic activity,
seismic impact zone,
surface water,
methane monitoring system,
corrective action,
primary liner,
secondary liner,
drainage layer,
cover liner,
leachate treatment,
gas collection,
rock quarrying,
leachate lagoon,
waste screening,
radioactive waste,
permitted and non-permitted
types of waste,
biomedical waste,
geomembrane,
quarterly water sampling,
split samples,
nested monitoring wells,
wastewater treatment system,
direct osmosis, reverse osmosis,
clay liner,
fire hazard,
Coffin Butte bedrock setting /

hydrogeology (fractured basalt, pillow basalt, regolith/soil), methane extraction well, leachate collection system, "the bubble", sediment ponds

Luckiamute Watershed Assessment (from student presentations)

Luckiamute watershed
Watershed defined
Luckiamute topography / climate
Coast Range climate
Willamette Valley rainshadow
Precipitation gradient
Bedrock geology
Siletz River volcanics
Spencer Formation
Yamhill Formation
Igneous intrusives
Tyee Formation
Hillslope regime
Valley-bottom regime
Debris flow hazards
Flood hazards
Hydric soils
Wetlands
Landuse history
Physiographic provinces
Watershed history
Pre-european history
Post-settlement history
Channel network
Surface water
Rain-on snow
Peak discharge
Impacts of fire on hydrology
Groundwater
Water quality
Rive discharge
Seasonal river discharge
Erosion potential
Land cover
Native vegetation
Oak Savanna
Doug-Fir/Pine ecotone
Invasive plants
Forest fire history
Aquatic resources
Salmonid species
Steelhead distribution
Coho distribution
In-stream structure
Coarse woody debris
Channel habitat
Endangered species

Groundwater

groundwater
meteoric water
connate water
juvenile water
porosity
permeability
horizontal permeability
vertical permeability
intergranular porosity
fracture porosity
solution cavities
pendular water
effective porosity
total porosity
yield porosity
primary vs. secondary porosity
Darcy's law
Q=KIA
hydraulic gradient
cross-sectional area
specific yield
specific retention
zone of aeration
vadose zone
zone of saturation
phreatic zone
water table
groundwater flow
cone of depression
aquifer
aquitard
artesian aquifer
water table aquifer
unconsolidated aquifer
consolidated aquifer
infiltration
groundwater contamination
contaminant plume
well
monitoring well
well hydraulics
total depth
screened interval
sand pack
well casing
riser pipe
static water level
depth to water
drawdown
hydraulic head
specific capacity
pumping rate

Willamette Valley Hydrogeology

hydrogeologic setting
Quaternary alluvium
Quaternary older alluvium
Quaternary terrrace deposits
Missoula Flood Deposits
Willamette Silts
gravel aquifer
unconfined aquifer
regional hydraulic gradient
Spencer Formation
Columbia River Basalts
Isopach Map
Groundwater Contour Map
salinity concentration
specific conductivity
contaminant sources
underground storage tank
environmental release
double-wall tank
vapor detection system
monitoring well
environmental property assessment
tank leakage
tank farm
agricultural practice
pesticide / herbicide
land use
production wells

municipal well supply
gravel aquifer

OR DEQ Voluntary Clean-up Program Case Studies

Voluntary cleanup, DEQ
Contamination sources
Soil / water contamination
VOC's
Metals
PCB's
Chlorinated solvents
Human risk
Risk-based cleanup
Passive vs. active remediation
In-situ treatments
Chemical treatment
Thermal treatment
Biological treatment
Hydrocarbon release
"free product"
Phase I, II, III site assessment
Water table
Chemical oxidation
Gravel aquifers
DNAPL
Vapor extraction

Roy Haggerty / Willamette Aquifer Case Study

Willamette silt
Willamette aquifer
Gravel aquifer
Willamette Confining Unit
Aquifer vs. aquitard
"buffer"
basalt aquifers
river alluvium
alluvial aquifers
Missoula flood gravels
Erratics
Pumping / drawdown
Pump tests
Slug test
Permeability
Storativity
Chemical buffer
Oxidation / reductions
Denitrification
Denitrifying bacteria

Sources of Ground Water Contamination Reading

Heavy metals
Organic chemicals
Chlorinated solvents
Industrial processes
Agricultural pesticides /herbicides
Underground storage tanks
Petroleum hydrocarbons
Land fills
Surface impoundments
Deep disposal wells
Septic / sewage wastes
NAPL's
DNAPL's
LNAPL's

Overview of Hydrogeologic Site Investigations Reading

Site history
Site geology
Site hydrogeology
Aquifer characterization
Contamination assessment
Contaminant characterization
Contaminant distribution analysis
Test borings / monitoring wells
Groundwater flow analysis
Groundwater flow gradients

Groundwater Remediation Reading

Passive vs. active remediation
Source removal
Plume confinement
Bioremediation
Chemical treatment
Natural attenuation
Groundwater flow barriers
Pump-and-treat systems
Capping and isolation
Interceptor trench
Capture zone
Bioremediation
Oxidation
Soil vapor extraction

Key Concepts and Lab Skills

Review your Luckiamute presentation notes, be able to summarize the hydrology, geology, climate and physiography of the basin; be able to answer true-false questions on the Luckiamute (i.e. did you take notes / pay attention during the student Luckiamute talks?). Can you describe the landuse and environmental concerns associated with the Luckiamute watershed? How is water quality affected?

Know how to work the groundwater well and aquifer equations

Do you know the basics and surfer and what the software does? Can you use surfer to solve a problem and create a groundwater map?

What are the primary elements of a Subtitle D landfill? How does the liner system work? How is methane managed? How is leachate managed? Why are the active landfill cells covered with plastic? What is a groundwater monitoring system and how does it work? Why are some types of wasted accepted at Coffin Butte, but others are not? What is a monitoring well and why is it important to measure water depth? Do you think it a good idea to actively excavate in old, unknown, military waste? What would be some alternative approaches to determining the type of military waste at Coffin Butte? Why are the basalts underlying Coffin Butte so fractured, faulted, and folded? What is the primary source of permeability in the basalts underlying Coffin Butte?

Can you contour groundwater elevation data? If given the depth to water and stick-up elevation, can you determine the groundwater elevation? Can you draw groundwater flow lines once you have a groundwater contour map?

what is the difference between a "confined aquifer" and "unconfined aquifer"? How are porosity and permeability related? What types of earth materials are associated with what types of porosity and permeability? (unconsolidated vs. bedrock?, examples (e.g. gravel vs. clay)).

What are the sources of environmental contamination in the Monmouth-Independence area? What are the controlling factors of groundwater flow in the Mon-Ind area? What are the aquifers?

Do you know how a monitoring well is constructed? Can you draw a diagram showing monitor well construction?

Can you operate surfer, contour data, create a vector map, overlay it on a contour map?

Do you know how to work the physics of landslides problems?

Can you list and discuss the sources of contaminants, types of contaminants, and remediation strategies as applied to the Willamette Valley?

Can you discuss (in an essay question) the hydrogeologic setting of the mid-Willamette Valley?

Can you discuss the geologic setting associated with the Missoula floods?

Can you relate Willamette Valley Hydrogeology to nitrate contamination problems?