Earth Science Institute II June 23, 2010
Day 3 Correlation of EarthComm Curriculum and HSCE's

EarthComm Curriculum Unit Code	
EDG1 = Earth's Dynamic Geospheres: Chapter 1, Volcanoes **EDG2** = Earth's Dynamic Geospheres: Chapter 2, Plate Tectonics **EDG2** = Earth's Dynamic Geospheres: Chapter 3, Earthquakes **EFS1** = Earth's Fluid Spheres: Chapter 1, Oceans **ENR1** = Earth's Natural Resources: Chapter 1, Energy Resources	**ENR3** = Earth's Natural Resources: Chapter 3, Water Resources **ESE1** = Earth System Evolution: Chapter 1, Astronomy **ESE2** = Earth System Evolution: Chapter 2, Climate Change **ESE3** = Earth System Evolution: Chapter 3, Changing Life

Location: Pilgrim River Delta / Mine Tailings	
EarthComm Connections	**ENR3** = Earth's Natural Resources: Chapter 3, Water Resources, Activity 2, p. R156 **ESE2** = Earth System Evolution: Chapter 2, Climate Change **ENR1** = Earth's Natural Resources: Chapter 1, Energy Resources, Activity 3, p. R25, Activity 4, p. R35, Activity 5, p. R41

Learning Outcomes:	**HSCE**
o Explain why the Earth is essentially a closed system in terms of matter.	E2.1A
o Analyze the interactions between the major systems (geosphere, atmosphere, hydrosphere, and biosphere) that make up the Earth.	E2.1B
o Explain, using specific examples, how a change in one system affects other Earth systems.	E2.1C
o Compare and contrast surface water systems (lakes, rivers, streams, wetlands) and groundwater in regard to their relative sizes as Earth's freshwater reservoirs and the dynamics of water movement (inputs and outputs, residence times, sustainability).	E4.1A
o Explain the features and processes of groundwater systems and how the sustainability of North American aquifers has changed in recent history (e.g., the past 100 years) qualitatively using the concepts of recharge, residence time, inputs, and outputs.	E4.1B
o Explain how water quality in both groundwater and surface systems is impacted by land use decisions.	E4.1C
o Describe natural mechanisms that could result in significant changes in climate (e.g., major volcanic eruptions, changes in sunlight received by the earth, and meteorite impacts).	E5.4B
o Based on evidence of observable changes in recent history and climate change models, explain the consequences of warmer oceans (including the results of increased evaporation, shoreline and	E5.4D

estuarine impacts, oceanic algae growth, and coral bleaching) and changing climatic zones (including the adaptive capacity of the biosphere).	
o Describe renewable and nonrenewable sources of energy for human consumption (electricity, fuels), compare their effects on the environment, and include overall costs and benefits.	E2.4A
o Explain how the impact of human activities on the environment (e.g., deforestation, air pollution, coral reef destruction) can be understood through the analysis of interactions between the four Earth systems.	E2.4B

Location: Houghton Water Supply / Sewage Treatment	
EarthComm Connections	**ENR3** = Earth's Natural Resources: Chapter 3, Water Resources, Activity 2, p. R156, Activity 4, p. R177, Activity 5, p. R184, Activity 6, p. R196 **ENR1** = Earth's Natural Resources: Chapter 1, Energy Resources, Activity 5, p. R41 **ESE3** = Earth System Evolution: Chapter 2, Changing Life, Activity 1, p. E148, Activity 2, p.E156, Activity 4, p.E173, Activity 5, p.E182 **ESE2** = Earth System Evolution: Chapter 2, Climate Change, Activity 5, p.E125, Activity 6, p.E136
Learning Outcomes:	HSCE
o Explain why the Earth is essentially a closed system in terms of matter.	E2.1A
o Analyze the interactions between the major systems (geosphere, atmosphere, hydrosphere, and biosphere) that make up the Earth.	E2.1B
o Explain, using specific examples, how a change in one system affects other Earth systems.	E2.1C
o Compare and contrast surface water systems (lakes, rivers, streams, wetlands) and groundwater in regard to their relative sizes as Earth's freshwater reservoirs and the dynamics of water movement (inputs and outputs, residence times, sustainability).	E4.1A
o Explain the features and processes of groundwater systems and how the sustainability of North American aquifers has changed in recent history (e.g., the past 100 years) qualitatively using the concepts of recharge, residence time, inputs, and outputs.	E4.1B
o Explain how water quality in both groundwater and surface systems is impacted by land use decisions.	E4.1C
o Explain the natural mechanism of the greenhouse effect, including comparisons of the major greenhouse gases (water vapor, carbon dioxide, methane, nitrous oxide, and ozone).	E5.4A
o Describe natural mechanisms that could result in significant changes in climate (e.g., major volcanic eruptions, changes in sunlight received by the earth, and meteorite impacts).	E5.4B
o Based on evidence of observable changes in recent history and	E5.4D

climate change models, explain the consequences of warmer oceans (including the results of increased evaporation, shoreline and estuarine impacts, oceanic algae growth, and coral bleaching) and changing climatic zones (including the adaptive capacity of the biosphere).	
o Describe renewable and nonrenewable sources of energy for human consumption (electricity, fuels), compare their effects on the environment, and include overall costs and benefits.	E2.4A
o Explain how the impact of human activities on the environment (e.g., deforestation, air pollution, coral reef destruction) can be understood through the analysis of interactions between the four Earth systems.	E2.4B
o Relate major events in the history of the Earth to the geologic time scale, including formation of the Earth, formation of an oxygen atmosphere, rise of life, Cretaceous-Tertiary (K-T) and Permian extinctions, and Pleistocene ice age.	E5.3C

Location: Baltic Mine	
EarthComm Connections	**EDG1** = Earth's Dynamic Geospheres: Chapter 1, Volcanoes, Activity 2, p.G14, Activity 6, p.G43 **EDG2** = Earth's Dynamic Geospheres: Chapter 2, Plate Tectonics **ENRI =** Earth's Natural Resources: Chapter 2, Minerals, Activity 2, p.R96, Activity 3, p.R111, Activity 5, p.R127, Activity 6, p.R136
Learning Outcomes:	HSCE
o Discriminate between igneous, metamorphic, and sedimentary rocks and describe the processes that change one kind of rock into another.	E3.1A
o Explain the relationship between the rock cycle and plate tectonics theory in regard to the origins of igneous, sedimentary, and metamorphic rocks.	E3.1B
o Use the distribution of earthquakes and volcanoes to locate and determine the types of plate boundaries.	E3.4A
o Describe how the sizes of earthquakes and volcanoes are measured or characterized.	E3.4B
o Describe the effects of earthquakes and volcanic eruptions on humans.	E3.4C
o Describe natural processes in which heat transfer in the Earth occurs by conduction, convection, and radiation.	E2.2C
o Describe the interior of the Earth (in terms of crust, mantle, and inner and outer cores) and where the magnetic field of the Earth is generated.	E3.2A
o Describe the differences between oceanic and continental crust (including density, age, and composition).	E3.2C
o Explain how plate tectonics accounts for the features and processes	E3.3A

(sea floor spreading, mid-ocean ridges, subduction zones, earthquakes and volcanoes, mountain ranges) that occur on or near the Earth's surface.	
o Explain why tectonic plates move using the concept of heat flowing through mantle convection, coupled with the cooling and sinking of aging ocean plates that result from their increased density.	E3.3B
o Describe the motion history of geologic features (e.g., plates, Hawaii) using equations relating rate, time, and distance.	E3.3C
o Distinguish plate boundaries by the pattern of depth and magnitude of earthquakes.	E3.3D

Location: Caledonia Mine	
EarthComm Connections	**EDG1** = Earth's Dynamic Geospheres: Chapter 1, Volcanoes, Activity 2, p.G14, Activity 6, p.G43 **EDG2** = Earth's Dynamic Geospheres: Chapter 2, Plate Tectonics **ENRI =** Earth's Natural Resources: Chapter 2, Minerals, Activity 2, p.R96, Activity 3, p.R111, Activity 5, p.R127, Activity 6, p.R136
Learning Outcomes:	HSCE
o Discriminate between igneous, metamorphic, and sedimentary rocks and describe the processes that change one kind of rock into another.	E3.1A
o Explain the relationship between the rock cycle and plate tectonics theory in regard to the origins of igneous, sedimentary, and metamorphic rocks.	E3.1B
o Use the distribution of earthquakes and volcanoes to locate and determine the types of plate boundaries.	E3.4A
o Describe how the sizes of earthquakes and volcanoes are measured or characterized.	E3.4B
o Describe the effects of earthquakes and volcanic eruptions on humans.	E3.4C
o Describe natural processes in which heat transfer in the Earth occurs by conduction, convection, and radiation.	E2.2C
o Describe the interior of the Earth (in terms of crust, mantle, and inner and outer cores) and where the magnetic field of the Earth is generated.	E3.2A
o Describe the differences between oceanic and continental crust (including density, age, and composition).	E3.2C
o Explain how plate tectonics accounts for the features and processes (sea floor spreading, mid-ocean ridges, subduction zones, earthquakes and volcanoes, mountain ranges) that occur on or near the Earth's surface.	E3.3A
o Explain why tectonic plates move using the concept of heat flowing through mantle convection, coupled with the cooling and sinking of aging ocean plates that result from their increased density.	E3.3B

○ Describe the motion history of geologic features (e.g., plates, Hawaii) using equations relating rate, time, and distance. ○ Distinguish plate boundaries by the pattern of depth and magnitude of earthquakes.	E3.3C E3.3D