VOLCANO OUTDOOR SCHOOL ACTIVITIES

ACTIVITY NAME	TIME (min)	SUBJECT	TEACHING METHOD	GRADE LEVEL			Next Generation Science Standards (NGSS)		
				2-5	6-8	9-12	SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Lava Races	15		game	✔	✔	✔	N/A	ESS2.A: Earth Materials and Systems	Structure and Function
1980 Eruption Story	30		interactive lecture, Q&A	✔	✔	✔	N/A	ESS1.C: The History of Planet Earth	Stability and Change
Eruption: The Musical	15		dramatization	✔			N/A	ESS1.C: The History of Planet Earth	Stability and Change
Plate Tectonics	30		cooperative learning	✔	✔		Analyzing and Interpreting Data	ESS2.B: Plate Tectonics and Large-scale systems interactions	Patterns
Recipe for a Mineral	30		game, model building	✔	✔	✔	N/A	ESS2.A: Earth Materials and Systems	Patterns
Reflections & Journaling	20		observations, journaling	✔	✔	✔	N/A	ESS2.E: Biogeology, LS2.C: Ecosystem Dynamics, Functioning and Resilience	Cause and Effect
Rock Investigation	20		observations	✔	✔		Obtaining, Evaluating and Communicating Information	ESS2.A: Earth Materials and Systems	Patterns
1980 Eruption Skits	60		dramatization, game	✔	✔	✔	N/A	ESS1.C: The History of Planet Earth	Cause and Effect
Hazard Mapping	120		cooperative learning , issue based inquiry		✔	✔	Constructing Explanations and Designing Solutions	ESS2.E: Biogeology, LS2.C: Ecosystem Dynamics, Functioning and Resilience	Patterns, Cause and Effect
In the Vicinity	120		group discussion, issue-based inquiry	✔	✔	✔	Analyzing and Interpreting Data, Engaging in Argument from Evidence	ESS1.C: The History of Planet Earth; ESS3.B: Natural Hazards	Patterns, Stability and Change
Volcano Yoga	15		dramatization	✔	✔	✔	N/A	ESS1.C: The History of Planet Earth	Cause and Effect

SUBJECT KEY:  geology  biology/ecosystems  humans/society

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				2-5	6-8	9-12	SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Aquatic Investigation	60		field study, guided inquiry	✔	✔	✔	Planning & Carrying Out Investigations; Analyzing and Interpreting Data	LS2.A: Interdependent Relationships in Ecosystems	Systems and Systems Models
Sediment Challenge	60		engineering challenge	✔	✔		Constructing Explanations & Designing Solutions	ESS3.B: Natural Hazards; EST1.B: Developing Possible Solutions	Systems and Systems Models
Sediment Debate	60		debate/roleplay, issue-based inquiry		✔	✔	Engaging in Argument from Evidence	ESS3.B: Natural Hazards, ETS2: Links Among Engineering, Technology, Science, and Society	Systems and Systems Models
GPS Scavenger Hunt	90		cooperative learning, confirmation inquiry, hike	✔	✔	✔	Engaging in Argument from Evidence; Planning & Carrying Out Investigations	ESS2.E: Biogeology; LS2.C: Ecosystem Dynamics, Functioning and Resilience	Cause and Effect
Volcanic Crisis Mission	90		jigsaw, issue-based inquiry		✔	✔	Analyzing & Interpreting Data; Engaging in Argument from Evidence	ESS3.B: Natural Hazards; ETS2: Links Among Engineering, Technology, Science, and Society	Patterns, Stability and Change
Ecology Field Study	120		field study, guided inquiry	✔	✔	✔	Planning & Carrying Out Investigations; Analyzing & Interpreting Data	LS2.C: Ecosystem Dynamics, Functioning and Resilience	Patterns
Elk Bench Hike	120		hike	✔	✔	✔	N/A	ESS2.E: Biogeology; LS2.C: Ecosystem Dynamics, Functioning and Resilience	Patterns, Cause and Effect
Geology Field Study	120		field study, guided inquiry		✔	✔	Planning & Carrying Out Investigations	ESS2.C: The Role of Water in Earth's Surface Processes; ESS3.B: Natural Hazards	Patterns
Hummocks Hike	120		hike	✔	✔	✔	N/A	ESS2.E: Biogeology; LS2.C: Ecosystem Dynamics, Functioning and Resilience	Patterns, Cause and Effect

SUBJECT KEY:  geology  biology/ecosystems  humans/society

MOUNT ST. HELENS INSTITUTE

LAVA RACES

Why was the eruption of Mount St. Helens in 1980 so explosive? Why does lava erupting from Mount St. Helens look different than lava erupting from volcanoes in Hawaii? Not all lava is the same. In this action-packed short activity, students simulate different lava types and consider the consequences of lava chemistry.

TIME: 15 min.
TEACHING METHOD: game

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
N/A	ESS2.A: Earth Materials and Systems	Structure and Function

1980 ERUPTION STORY

Learn about the story of the 1980 eruption of Mount St. Helens within the heart of the blast zone from our engaging and knowledgeable staff. Our 1980 eruption story is interactive and customized to the interests of your group. Bring your questions and curiosities!

TIME: 30 min.
TEACHING METHOD: interactive lecture, Q&A

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
N/A	ESS1.C: History of Planet Earth	Cause and Effect

HAZARD MAPPING

What does it mean to live near an active volcano? Students work in teams to design a community that can thrive despite nearby volcanoes. Students learn to work with a hazard map informing them of areas in their community at risk. Students make decisions to modify elements of their community's design based on the potential hazards.
TIME: 40 min.
TEACHING METHOD: cooperative learning, issue-based inquiry

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Constructing Explanations and Designing Solutions	ESS3.B: Natural Hazards	Systems and Systems Models

PLATE TECTONICS

What causes volcanoes to erupt in the Pacific Northwest? In this hands-on activity students learn about plate tectonics and explore how the structure of the Earth creates volcanoes and earthquakes Students piece together the Earth's tectonic plates, identify plate boundaries and map hazardous events that have occurred across the globe.

TIME: 30 min.
TEACHING METHOD: cooperative learning

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Analyzing and Interpreting Data	ESS2.B: Plate Tectonics and Large-Scale Systems Interactions	Patterns, Systems and System Models

RECIPE FOR A MINERAL

How do rocks form in magma chambers inside volcanoes? What determines the types of minerals that form in different rocks? Students cooperate in teams to model crystal formation in magma and use this model to construct an explanation that explains the patterns they observe.

TIME: 30 min.
TEACHING METHOD: game, model building

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
N/A	ESS2.A: Earth's Materials and Systems	Patterns, Systems and System Models

REFLECTIONS AND JOURNALING

What inspires you about Mount St. Helens? Students draw or write in their journal from a spot of their own with breathtaking views of the Mount St. Helens landscape. With inspiration from poems, stories and the natural scenery, journal activities often include writing, drawing and recording observations from microscopes.

TIME: 20 min.
TEACHING METHOD: observations, journaling

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
N/A	ESS2.E: Biogeology, LS2.C: Ecosystem Dynamics, Functioning and Resilience	Cause and Effect

ROCK INVESTIGATION

Why are rocks at Mount St. Helens so varied and colorful? Volcanoes can erupt in many different ways, producing rocks which each have a unique story to tell. Students make observations of igneous rocks and learn how to read the rocks' stories using features such as texture, density, color, minerals, and bubble content.

TIME: 30 min.
TEACHING METHOD: interactive lecture, Q&A

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Obtaining, evaluating and communicating information	ESS1.A: Earth Materials and Systems	Cause and Effect

1980 ERUPTION SKITS

Lights, Camera, Action! In small teams, students perform a skit focused on the cause of an event which occurred before, during, or after the 1980 eruption. After each group's performance, the audience identifies the effects of the skit, altogether forming a play that details a sequence of cause-and-effect events at Mount St. Helens.

TIME: 60 min.
TEACHING METHOD: dramatization, game

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
N/A	ESS1.C: The History of Planet Earth	Cause and Effect

ERUPTION: THE MUSICAL

Experience the 1980 eruption of Mount St. Helens through interactive storytelling. Students will serve as the special effects/sound crew for the production of "1980 The Musical!" Students will read aloud different portions of the 1980 story and as a group provide sound effects to make the story more engaging and memorable.

TIME: 15 min.
TEACHING METHOD: dramatization

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Constructing Explanations and Designing Solutions	ESS3.B: Natural Hazards	Systems and Systems Models

IN THE VICINITY

How active are volcanoes in the Cascades Range? In small groups, students piece together the geologic history of a single volcano to identify and interpret patterns in the volcano's eruptive history. Students engage in a discussion based on their observations and interpretations to inform decision-making in their imaginary communities.

TIME: 40 min.
TEACHING METHOD: group discussion, issue-based inquiry

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Analyzing and Interpreting Data, Engaging in Argument from Evidence	ESS1.C: The History of Planet Earth, ESS3.B: Natural Hazards	Patterns, Stability and Change

VOLCANO YOGA

What happened during the eruption of Mount St. Helens in 1980? What were the first signs of the eruption? How far did the blast travel and how fast was volcanic debris ejected? Students reenact the eruption of Mount St. Helens in 1980 using their bodies.

TIME: 15 min.
TEACHING METHOD: game

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
N/A	ESS1.C: The History of Planet Earth	Structure and Function

AQUATIC INVESTIGATION

How has life returned to Mount St. Helens? Students collect samples of aquatic life—macroinvertebrates and amphibians—along the shores of lakes and ponds created by the 1980 eruption of Mount St. Helens. Students learn to identify species and compare species abundance and diversity at different sites.

TIME: 60 min.
TEACHING METHOD: field study, guided inquiry

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Planning and Carrying Out Investigations, Analyzing and Interpreting Data	LS2.A: Interdependent Relationships in Ecosystems	Systems and Systems Models

SEDIMENT CHALLENGE

Students learn about the long-term hazard created by the eruption landslide debris. Students conduct brief experiments in small groups with a simple stream table to simulate sediment transport. Students design an engineering solution to mitigate the hazard using their choice of natural and manmade elements. After observing the effectiveness of their and others' design, they refine and optimize their design.

TIME: 60 min.
TEACHING METHOD: engineering challenge

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Constructing Explanations and Designing Solutions	ESS3.B: Natural Hazards, EST1.B: Developing Possible Solutions	Systems and Systems Models

SEDIMENT DEBATE

How does the eruption of Mount St. Helens in 1980 continue to affect communities downstream? Students learn about present-day environmental and economic issues at Mount St. Helens. In teams, students evaluate the long-term hazard created by the eruption landslide debris and roleplay as stakeholders to develop, present and debate ideas.

TIME: 60 min.
TEACHING METHOD: debate/roleplay, issue-based inquiry

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Engaging in Argument from Evidence	ESS3.B: Natural Hazards; ETS2: Links Among Engineering, Technology, Science, & Society	Systems and Systems Models

GPS SCAVENGER HUNT

In small teams, students use hand-held GPS devices to navigate to hidden boxes, each containing evidence and a question. Teams gather for a mock science conference where they learn to communicate their findings.

TIME: 90 min.
TEACHING METHOD: cooperative learning, confirmation inquiry

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Engaging in Argument from Evidence, Planning and Carrying Out Investigations	ESS2.E: Biogeology, LS2.C: Ecosystem Dynamics, Functioning and Resilience	Cause and Effect

VOLCANIC CRISIS MISSION

Students role-play as members of a volcano observatory in one of four specialist groups: Seismicity, Ground Deformation, Gas Emissions and Communications. Their job is to watch the volcano closely and to set the appropriate Volcano Alert Level. After a brief training phase, the scientists will begin to receive data from their volcano in different phases. Teams share data and must votes to set the Volcano Alert Level. This activity models what occurred at Mount St. Helens in the eruption of 2004-2008.

TIME: 90 min.
TEACHING METHOD: jigsaw, issue-based inquiry

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Analyzing and Interpreting Data, Engaging in Argument from Evidence	ESS3.B: Natural Hazards, ETS2: Links Among Engineering, Technology, Science, and Society	Patterns, Stability and Change

ECOLOGY FIELD STUDY

How do contemporary field ecologists study Mount St. Helens? In teams, students use GPS technology to investigate the geology, ecology, and human history of the Mount St. Helens area. Students measure vegetative growth or aquatic health at permanent student plots near Coldwater Ridge or the Hummocks. Teams use a variety of equipment, learn to record data, and can conduct simple analysis and comparisons.

TIME: 120 min.
TEACHING METHOD: field study, guided inquiry

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Planning and Carrying Out Investigations, Analyzing and Interpreting Data	LS2.C: Ecosystem Dynamics, Functioning and Resilience	Patterns

ELK BENCH HIKE

How has the landscape affected by the 1980 eruption of Mount St. Helens recovered? Hike along the Elk Bench Trail guided by our knowledgeable staff and explore firsthand how plants and animals have returned to the blast zone. This trail leads down to Coldwater Lake, a brand-new lake formed by the 1980 eruption landslide.

TIME: 120 min.
TEACHING METHOD: hike
ACCESSIBILITY: 2 miles round trip with elevation gain of 800 feet. Hike can be shortened or modified for group accessibility needs.

GEOLOGY FIELD STUDY

What can the sediment beneath your feet tell you about the 1980 eruption of Mount St. Helens? In this activity, students learn real-world practices used by geologists to study the history of past eruptions. Students investigate the sediments in various locations at Mount St. Helens and determine what type of volcanic processes formed the deposits.

TIME: 120 min.
TEACHING METHOD: field study, guided inquiry

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
Planning and Carrying Out Investigations	ESS2.C: The Role of Water in Earth's Surface Processes, ESS3.B: Natural Hazards	Patterns

HUMMOCKS HIKE

On this hike, students make observations of landscape features and to use critical thinking skills to interpret the fascinating geological and ecological stories of Mount St. Helens. Students hike amongst landslide deposits from the 1980 eruption and observe beaver ponds, plant communities, erosional features and more!

TIME: 120 min.
TEACHING METHOD: hike
ACCESSIBILITY: 2.5 miles round trip with elevation gain of 500 feet. Hike can be shortened or modified for group accessibility needs.

SCIENCE & ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
N/A	ESS2.E: Biogeology, LS2.C: Ecosystem Dynamics, Functioning and Resilience	Patterns, Cause and Effect