From Space to Earth: Meteor Crater

www.barringercrater.com

Student Handout A: What If…?
Experimenting with Impact Scenarios - Projectile Diameter

Student Name:

Date:

What if a meteorite traveling at a different velocity or with a different size had crashed at the site of the Barringer Meteorite Crater? What would the resulting crater look like? Would the environmental impacts change?

Use an online simulation tool (the Earth Impact Effects Program developed by Marcus, Melosh, and Collins at University of Arizona) to see how the final crater and its environmental effects depend on impact parameters such as the size and density of the projectile, impact velocity and angle, and target material type.

Directions

Go to *http://www.lpl.arizona.edu/impacteffects/*

Input the parameters listed below for the impact at Barringer Meteorite Crater.

Change ONLY the variable listed below. Keep all others the same.

Calculate the effects (push button)

Repeat for a total of 4 trials, noting the change in variable on the table.

Parameters for the Barringer Meteorite Crater:

Distance from Impact	20 km
Projectile Diameter	45 m
Projectile Density	8000kg/m³ iron
Impact Velocity	20km/sec (12.40 m/sec)
Impact Angle	45˚

Target Density	**2500kg/m³**			
Target type	**Sedimentary rock**			

Projectile Diameter	Barringer Crater- 45 m	Trial 1 – 55m	Trial 2 – 70m	Trial 3 – 100m
Energy in MegaTons Before Atmospheric Entry				
Major global change- Describe briefly.				
What happens to the projectile when it enters the atmosphere? At what velocity does it hit the Earth? Impact Energy in MegaTons				
Final Crater dimensions- Diameter: Depth:				
Type of crater formed				

Projectile Diameter	Barringer Crater- 45 m	Trial 1 – 55m	Trial 2 – 70m	Trial 3 – 100m
Thermal Radiation – yes /no				
If yes, Time for Maximum radiation: Fireball radius: Effects of thermal radiation:				
Seismic Effects Richter Scale: Mercalli:				

Projectile Diameter	Barringer Crater- 45 m	Trial 1 – 55m	Trial 2 – 70m	Trial 3 – 100m
Ejecta: Average thickness: Mean diameter:				
Air Blast Maximum wind Velocity: Damage description:				

Reflections

1. Was there any change in what happened to the projectile as you changed your variable?

2. Did the diameter of the resulting crater change significantly?

3. Was there any difference in the ejecta?

4. From your position at 20km, was there any significant change regarding thermal radiation?

5. From your position at 20km, was there any significant change from the air blast?

6. What aspect of the final crater or environmental effect was most changed by the change in projectile diameter? Overall, what do you conclude about the effect of the projectile diameter to the impact event?