FLINN SCIENTIFIC

Name_____

Detecting Nuclear Radiation

Data Table

Track Descriptions	Observations

Post-Lab Questions *(Use a separate sheet of paper to answer the following questions.)*

1. Describe the different kinds of tracks observed in the cloud chamber. Using the properties of alpha particles and beta particles, predict which tracks were probably produced by each particle.
2. Explain why some tracks may have been observed only very close to the radioactive source, while other types of tracks were observed farther away from the source.
3. What is the purpose of using dry ice to cool the cloud chamber? What would happen if the entire chamber, including the sides and the blotting paper, were too cold? What would happen if the cloud chamber were too warm?
4. Explain why rubbing the top of the cloud chamber with silk may be used to refresh the cloud chamber, causing the tracks to disappear and then reappear.
5. Some cloud tracks will be observed in the chamber even in the absence of a radioactive source. What is the possible origin of these tracks?
6. Because of its low penetrating power, alpha radiation is not an external hazard. However, inhaling radioactive "dust" that emits alpha particles is very dangerous. Explain.

Background Radiation Worksheet

Radiation exposure in the United States is most commonly expressed in units of rems and millirems (1 rem = 1000 millirem). The rem estimates the "biologically effective dose" of different types of ionizing radiation on living tissue. It takes into account not only the actual amount of radiation energy absorbed per kilogram of tissue, but also the relative "ionizing ability" of alpha, beta, and gamma radiation, X-rays, etc. (The ionizing ability of alpha radiation, for example, is about 20 times greater than that of X-rays.) The average radiation dose per person in the United States is about 360 millirems per year. Use the following worksheet to estimate your annual exposure to background radiation.

Source	**Exposure (mrem/year)**
A. Natural Radiation	
Radon	200
Uranium and other elements in the ground Gulf/Atlantic Coasts, 16 mrem Continental U.S., 30 mrem Colorado Plateau, 63 mrem	40
Carbon-14 and potassium-40	
Houses made of brick, stone, or concrete (7 mrem)	
Cosmic radiation (depends on elevation) 0–1000 ft, 26 mrem 1000–2000 ft, 31 mrem 2000–3000 ft, 35 mrem 3000–4000 ft, 41 mrem 4000–5000 ft, 47 mrem 5000–6000 ft, 52 mrem	
B. Artificial Radiation	
X-rays Dental, 1 mrem Arm or leg, 1 mrem Chest, 6 mrem Heat, 20 mrem Upper GI, 245 mrem	
Nuclear Medicine CAT Scan, 110 mrem Radiographic imaging, 14 mrem	
Watching TV (2 mrem)	
Working with a computer (1 mrem)	
Air travel (1 mrem per 2-hour flight)	

Draw a bar graph or a pie chart showing the percent background radiation contributed by various sources.