

Radiation Information Provided by the U. S. Federal Aviation Administration for Aircrews

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Air carrier aircrews are occupationally exposed to ionizing radiation. This report will address information about such radiation that is given to aircrews by the U. S. Federal Aviation Administration (FAA). Ionizing radiation refers to subatomic particles of matter (e.g., neutrons, protons, and electrons) and massless particles (e.g., X-rays and gamma rays), with each particle having sufficient energy so that on interacting with a material it can cause an atom to lose an orbital electron. Such occurrences in body tissues may lead to health problems.

Air travelers are continuously exposed to ionizing radiation coming from outside the solar system. The radiation is called galactic cosmic radiation; a main source is believed to be supernovae (exploding stars). Occasionally, a severe disturbance in the sun leads to a large flux of high-energy, ionizing-radiation particles (often called solar cosmic radiation) that penetrate the earth's magnetic field and enter the atmosphere. Radioactive cargo is another source of radiation exposure for air travelers.

The earth's magnetic field (geomagnetic field) and atmosphere provide limited shielding from galactic cosmic radiation and solar cosmic radiation.

A computer program (called CARI), which can be accessed via the Internet, estimates the dose of galactic cosmic radiation received on a flight. A solar radiation alert system, which can be accessed worldwide via the U.S. National Oceanic and Atmospheric Administration's Weather Wire Service (NWWS), warns of the beginning of a disturbance on the sun that may lead to high dose rates of ionizing radiation at high flight altitudes.

At the radiation doses normally received by aircrews, an increased risk of fatal cancer is the principal health concern. Genetic defects passed on to future generations are another possible consequence of a crewmember's exposure to ionizing radiation. Prenatal death could result from any dose of ionizing radiation during the first day of development. Methods will be given for estimating health risks. Estimated flight doses for a variety of routes will be presented along with FAA-recommended occupational-radiation exposure limits for aircrews.

Keywords: Galactic cosmic radiation; solar cosmic radiation; aircrews.