

HAZARD IDENTIFICATION AND VULNERABILITY ANALYSIS (HIVA)

Walla Walla County, Washington

RADIOLOGICAL

Hazard Overview

The nuclear facilities operated by the U.S. Department of Energy (USDOE) and the Energy Northwest are located at the Hanford Nuclear Reservation in Benton County, which is about 16 miles to the closest point of Walla Walla County (Burbank) and about 55 miles from the City of Walla Walla. The USDOE facilities include nuclear waste storage tanks and research laboratories. The Columbia Generating Station is an 1180-megawatt boiling water reactor used to produce electrical power, operated by Energy Northwest, a commercial power producer. It was formerly known as Washington Nuclear Power Plant #2.

A significant hazard requiring emergency planning stems from the presence of large quantities of radioactive materials from the various separations, waste store, research and power generating station. These materials, although contained, could affect public health and environment in the event of a release during a major accident.

People are continuously exposed to radiation. Radiation is energy emitted through space and matter. Radiation is the emission of particles or waves of energy from unstable atoms. These energetic, invisible particles or waves can injure living organisms under certain conditions. Measurement of radiation doses to human tissue is expressed in rem or mrem (milirem or 1000th of a rem)
Example: One chest X-Ray gives you about 10 mrem of radiation, or .01 rem. A dental X-Ray emits 1 mrem, or .001 rem.

The average person in the United States receives about 360 mrem every year. This is mostly from natural sources of radiation, such as radon.

Radiation causes ionizations in the molecules of living cells. These ionizations result in the removal of electrons from the atoms, forming ions or charged atoms. The ions formed can then go on to react with other atoms in the cell, causing damage. An example of this would be if a gamma ray passes through a cell, the water molecules near the DNA might be ionized and the ions might react with the DNA causing it to break.

At low doses (what we receive every day from background radiation) the cells repair the damage rapidly. At higher doses (nearing 100 rem), the cells might not be able to repair the damage, and the cells may either be changed permanently or die. Most cells that die are of little consequence, the body can just replace them. Cells changed permanently may go on to produce abnormal cells when they divide. In the right circumstance, these cells may become cancerous. This is the origin of our increased risk in cancer, because of radiation exposure.

At even higher doses, the cells cannot be replaced fast enough and tissues fail to function. An example of this would be "radiation sickness." This is a condition

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that results after high doses to the whole body (>100 rem). Where the intestinal lining is damaged to the point that it cannot perform its functions of intake of water and nutrients, and protecting the body against infection. This leads to nausea, diarrhea and general weakness. With higher whole body doses (>300 rem), the body's immune system is damaged and cannot fight off infection and disease. At whole body doses near 400 rem, if no medical attention is given, about 50% of the people are expected to die within 60 days of the exposure, due mostly from infections.

If someone receives a whole body dose more than 1,000 rem, they will suffer vascular damage of vital blood providing systems for nervous tissue, such as the brain. It is likely at doses this high, 100% of the people will die, from a combination of all the reasons associated with lower doses and the vascular damage.

Washington State initiates protective actions based on the trigger levels recommended by the Environmental Protection Agency and the Food and Drug Administration.

Evacuate or shelter-in-place 1,000 mrem (or 1 rem)
Relocate 5,000 mrem (or 5 rem)
Interdict contaminated food 500 mrem

History and Probability of Occurrence

The likelihood of an accident causing the release of radiation to reach Walla Walla County in sufficient concentration to harm people or agricultural products is low.

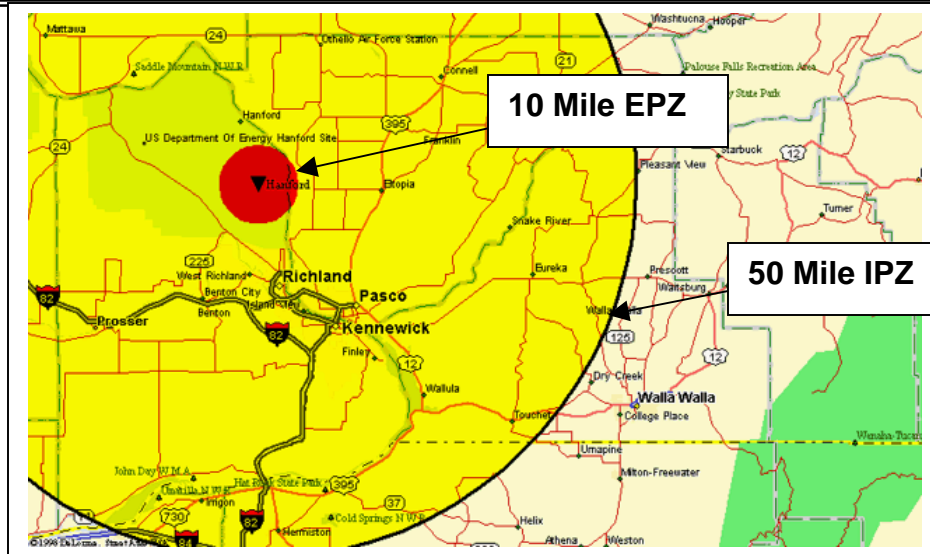
The probability of a major release of radiation affecting Walla Walla County in the next 25 years is LOW.

Vulnerability

The U.S. Nuclear Regulatory Commission (NRC) requires hazard assessments and emergency plans for radiological hazards. They are based on scientific data to estimate the radiation that may escape off the Hanford site. They require Emergency Planning Zones (EPZ) for both Plume Exposure Pathways and Ingestion Planning Zone (IPZ). Both the USDOE Hanford and Energy Northwest have made these assessments and identified specific hazards for each facility, release scenarios and consequences and areas where planning is required.

The Ingestion Planning Zone is planned when exposure to a passing cloud, or plume, of the radiation would result in direct contact inhalation of the radiation. A 10-mile radius from nuclear facilities defines this area.

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The Ingestion Planning Zone (50 Mile IPZ) is an area expected to be contaminated with radiation when dispersal of the radiation to various internal organs following eating or drinking of contaminated food or water. The 50-mile IPZ is shown on the figure above.

In the worse case Hanford or Energy Northwest scenario affecting Walla Walla County, there would be a release of radioactive material from Hanford, which would be carried by the wind. Livestock, open water storage and crops in the IPZ would be contaminated. Controls would be necessary to prevent farm produce that may be contaminated from being used for human consumption.

Walla Walla County is well outside of the 10 mile EPZ established by U.S. NRC for both Hanford and Energy Northwest. Health risks because of direct exposure to radiation are very low in Walla Walla County.

An important segment of Walla Walla County's population, property, commerce, infrastructure or service is exposed to the effects of this hazard. In a worse case scenario there could be a disaster of moderate to major, though not catastrophic, proportions. The vulnerability of crops, livestock and produce to such an event is high. Although the vulnerability of people's health is low, the economic vulnerability of Walla Walla County is MEDIUM.

Risk Rating

Although there is little likelihood that such an event will occur, the economic consequences will be high. The overall risk rating for this hazard is rated at MEDIUM. The threat is great enough to warrant modest effort to prepare for, respond to, recover from, and mitigate against this hazard. This hazard should be included in the county's emergency management training and exercise program.

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