Fact Sheet on Environmental Monitoring

Printable Version

Background

The discharge of radioactive effluents from routine nuclear power plant operations can have environmental im man, animals, plants, and sea life. During the licensing of a nuclear plant, NRC issues a Final Environmental S (FES) which identifies these potential impacts. As part of NRC's requirements for operating a nuclear power pl must:

- keep releases of radioactive material to unrestricted areas during normal operation as low as reasonabl (as described in the Commission's regulations in 10 CFR Part 50.36a), and
- comply with radiation dose limits for the public (10 CFR Part 20).

In addition, NRC regulations require licensees to have various effluent and environmental monitoring program that the impacts from plant operations are minimized. The permitted effluent releases result in very small dos members of the public living around nuclear power plants.

Regulations

Current regulations to limit offsite releases and their associated radiation doses are much more restrictive tha required for nuclear power plants licensed in the 1960s. In 1975, the NRC amended its regulations (in 10 CFR and 50.36 and a new Appendix I) to provide numerical guides for design objectives and limiting conditions for meet the radiation dose criterion "as low as is reasonably achievable." Adoption of these regulations requires releases be kept to doses well below the radiation exposure limits for the public in 10 CFR Part 20.

In late 1979, the Environmental Protection Agency (EPA) placed an additional radiation dose requirement on r licensees. This requirement established total body, thyroid, and other organ dose limits for radioactive effluen radiation. The NRC incorporated EPA's regulation into 10 CFR Part 20 in 1981, and all plants must now meet t requirements.

Monitoring Environmental Impacts

The NRC requires licensees to report plant discharges and results of environmental monitoring around their pl that potential impacts are detected and reviewed. Licensees must also participate in an interlaboratory compa which provides an independent check of the accuracy and precision of environmental measurements.

In annual reports, licensees identify the amount of liquid and airborne radioactive effluents discharged from p associated doses. Licensees also must report environmental radioactivity levels around their plants annually. available to the public, cover sampling from TLDs (thermoluminescent dosimeters); airborne radioiodine and p samplers; samples of surface, groundwater, and drinking water and downstream shoreline sediment from exis potential recreational facilities; and samples of ingestion sources such as milk, fish, invertebrates, and broad vegetation.

The NRC conducts periodic onsite inspections of each licensee's effluent and environmental monitoring progra compliance with NRC requirements. The NRC documents licensee effluent releases and the results of their env monitoring and assessment effort in inspection reports that are available to the public.

Enclosure 3

Over the past 25 years, radioactive effluents released from nuclear power plants have decreased significantly. early part of that period, a significant contributor to the reduction was the addition of special systems (augme systems) to boiling water reactors, which process some of the noncondensible gases formed in the reactor pr the radioactive gases released to the environment. In recent years, improved fuel performance and licensees' effluent control programs further contributed to reducing radioactive effluents.

February 2002

Fact Sheet on Biological Effects of Radiation

Printable Version

Radiation

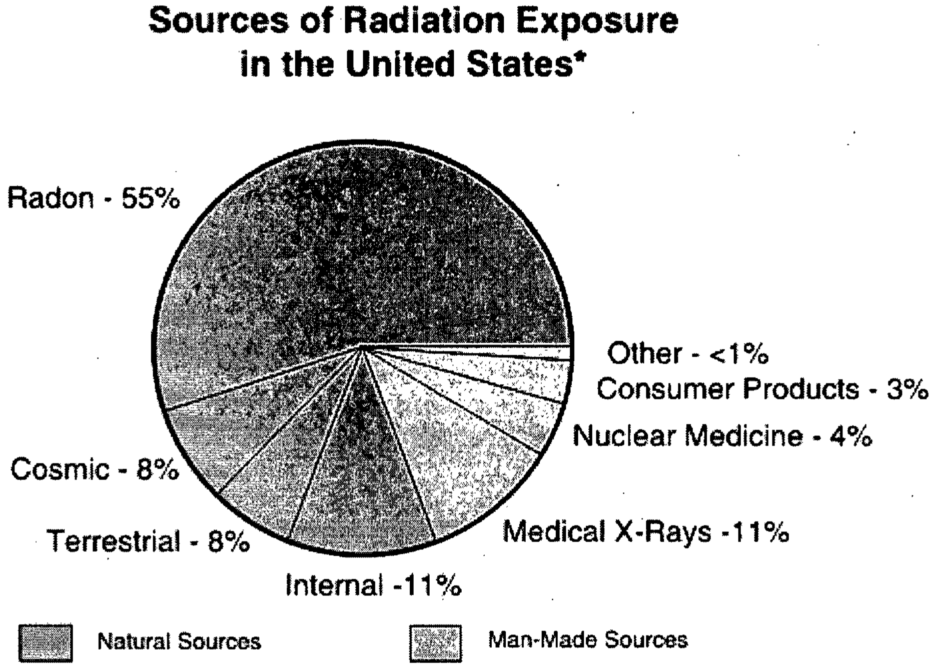
Radiation is all around us. It is naturally present in our environment and has been since the birth of this plane evolved in an environment which has significant levels of ionizing radiation. It comes from outer space (cosmi (terrestrial), and even from within our own bodies. It is present in the air we breathe, the food we eat, the wa construction materials used to build our homes. Certain foods such as bananas and brazil nuts naturally conta radiation than other foods. Brick and stone homes have higher natural radiation levels than homes made of o such as wood. Our nation's Capitol, which is largely constructed of granite, contains higher levels of natural ra

Levels of natural or background radiation can vary greatly from one location to the next. For example, people exposed to more natural radiation than residents of the east or west coast because Colorado has more cosmic altitude and more terrestrial radiation from soils enriched in naturally occurring uranium. Furthermore, a lot o due to radon, a gas from the earth's crust that is present in the air we breathe.

The average annual radiation exposure from natural sources to an individual in the United States is about 30C *. Radon gas accounts for two-thirds of this exposure, while cosmic, terrestrial, and internal radiation accoun adverse health effects have been discerned from doses arising from these levels of natural radiation exposure

In addition, man-made sources of radiation from medical, commercial, and industrial activities contribute ano to our annual radiation exposure. One of the largest of these sources of exposure is medical x-rays. Diagnosti account for about 40 mrem (0.4 mSv) each year. In addition, some consumer products such as tobacco, fertil mantles, luminous watch dials, and smoke detectors contribute another 10 mrem (0.1 mSv) to our annual rac

A typical breakdown between natural background radiation and artificial sources of radiation is shown in the p natural radiation contributes about 82% of the annual dose to the population while medical procedures contril 18% for a total annual average radiation exposure of 360 mrem (3.6 mSv)*. Both natural and artificial radiat way.



Note: The United Nations Scientific Committee on the Effects of Atomic Radiation 2000 Report suggests annual radiation dose from diagnostic x-rays in the U.S. has increased slightly so that the percentage c medical procedures may be slightly higher than that represented in the pie chart above.

Above background levels of radiation exposure, the NRC requires that its licensees limit maximum radiation e members of the public to 100 mrem (1mSv) per year, and limit occupational radiation exposure to adults wor material to 5,000 mrem (50 mSv) per year. NRC regulations and radiation exposure limits (contained in Title Regulations under Part 20) are consistent with recommendations of national and international scientific organ in other developed nations.

Biological Effects of Radiation

We tend to think of biological effects of radiation in terms of their effect on living cells. For low levels of radiat biological effects are so small they may not be detected. The body has repair mechanisms against damage in as by chemical carcinogens. Consequently, biological effects of radiation on living cells may result in three out damaged cells repair themselves, resulting in no residual damage; (2) cells die, much like millions of body cel replaced through normal biological processes; or (3) cells incorrectly repair themselves resulting in a biophysi

The associations between radiation exposure and the development of cancer are mostly based on populations levels of ionizing radiation (e.g., Japanese atomic bomb survivors, and recipients of selected diagnostic or the procedures). Cancers associated with high dose exposure (greater than 50,000 mrem) include leukemia, brea lung, esophagus, ovarian, multiple myeloma, and stomach cancers. Department of Health and Human Service a possible association between ionizing radiation exposure and prostate, nasal cavity/sinuses, pharyngeal and cancer.

The period of time between radiation exposure and the detection of cancer is known as the latent period and cancers that may develop as a result of radiation exposure are indistinguishable from those that occur natura exposure to other chemical carcinogens. Furthermore, National Cancer Institute literature indicates that other hazards and lifestyle factors (e.g., smoking, alcohol consumption, and diet) significantly contribute to many o

Although radiation may cause cancers at high doses and high dose rates, currently there are no data to unequ occurrence of cancer following exposure to low doses and dose rates -- below about 10,000 mrem (100 mSv) areas having high levels of background radiation -- above 1,000 mrem (10 mSv) per year-- such as Denver, adverse biological effects.

Even so, the radiation protection community conservatively assumes that any amount of radiation may pose cancer and hereditary effect, and that the risk is higher for higher radiation exposures. A linear, no-threshold relationship is used to describe the relationship between radiation dose and the occurrence of cancer. This do suggests that any increase in dose, no matter how small, results in an incremental increase in risk. The LNT h the NRC as a conservative model for determining radiation dose standards recognizing that the model may ov

High radiation doses tend to kill cells, while low doses tend to damage or alter the genetic code (DNA) of irrac kill so many cells that tissues and organs are damaged immediately. This in turn may cause a rapid body resp Radiation Syndrome. The higher the radiation dose, the sooner the effects of radiation will appear, and the hi death. This syndrome was observed in many atomic bomb survivors in 1945 and emergency workers respond nuclear power plant accident. Approximately 134 plant workers and firefighters battling the fire at the Cherno high radiation doses--80,000 to 1,600,000 mrem (800 to 16,000 mSv)-- and suffered from acute radiation si within the first three months from their radiation injuries. Two more patients died during the first days as a re from the fire and radiation.

Because radiation affects different people in different ways, it is not possible to indicate what dose is needed t believed that 50% of a population would die within thirty days after receiving a dose to the whole body, over few minutes to a few hours, between 350,000 to 500,000 mrem (3500 to 5000 mSv). This would vary depen individuals before the exposure and the medical care received after the exposure. These doses expose the wh very short period of time (minutes to hours). Similar exposure of only parts of the body will likely lead to mor skin burns.

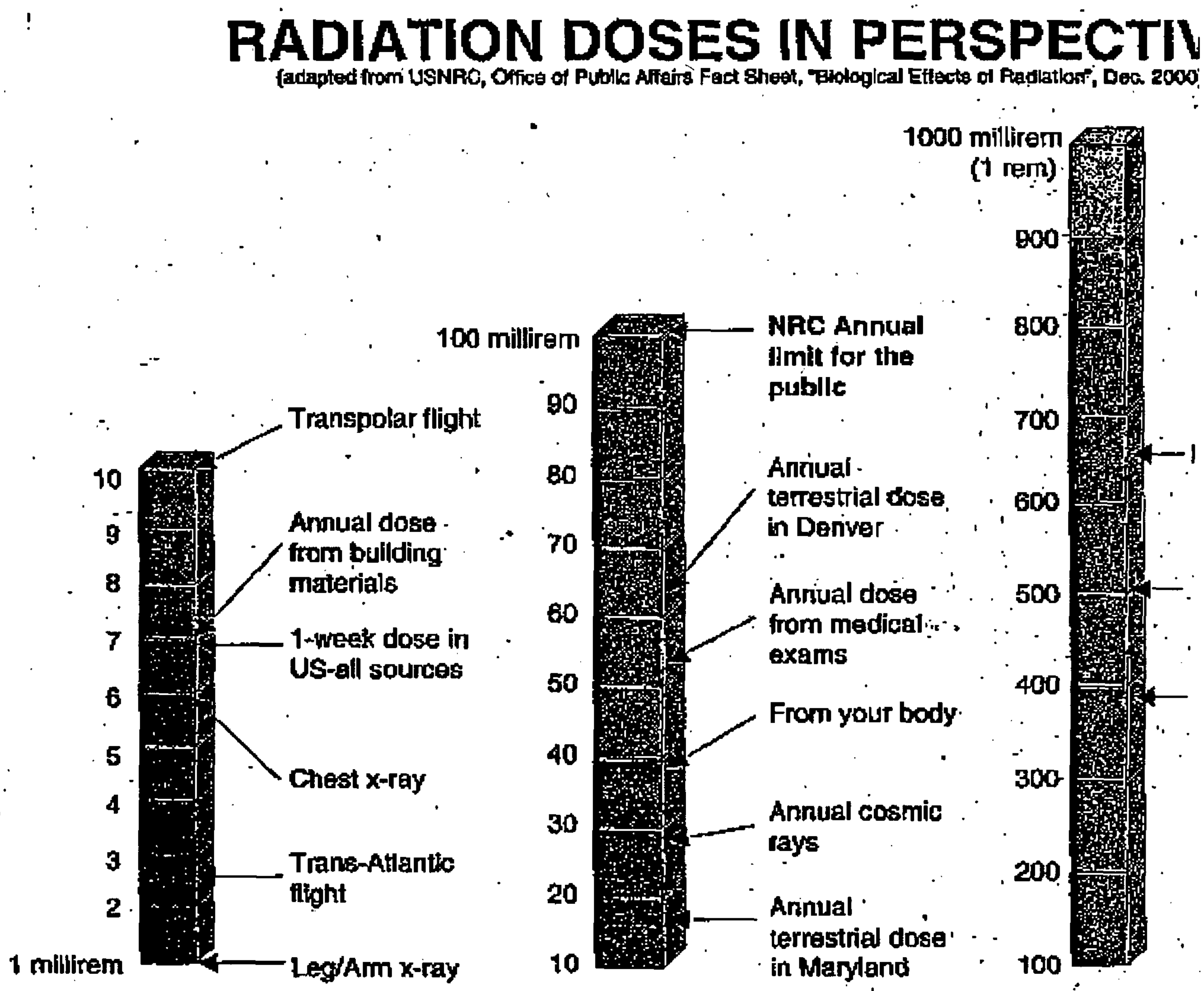
Conversely, low doses--less than 10,000 mrem (100 mSv)-- spread out over long periods of time (years to de immediate problem to any body organ. The effects of low doses of radiation, if any, would occur at the level c changes may not be observed for many years (usually 5-20 years) after exposure.

Genetic effects and the development of cancer are the primary health concerns attributed to radiation exposu occurring after radiation exposure is about five times greater than a genetic effect (e.g., increased still births, infant mortality, childhood mortality, and decreased birth weight). Genetic effects are the result of a mutation reproductive cells of an exposed individual that are passed on to their offspring. These effects may appear in direct offspring, or may appear several generations later, depending on whether the altered genes are domin

Although radiation-induced genetic effects have been observed in laboratory animals (given very high doses c of genetic effects has been observed among the children born to atomic bomb survivors from Hiroshima and N

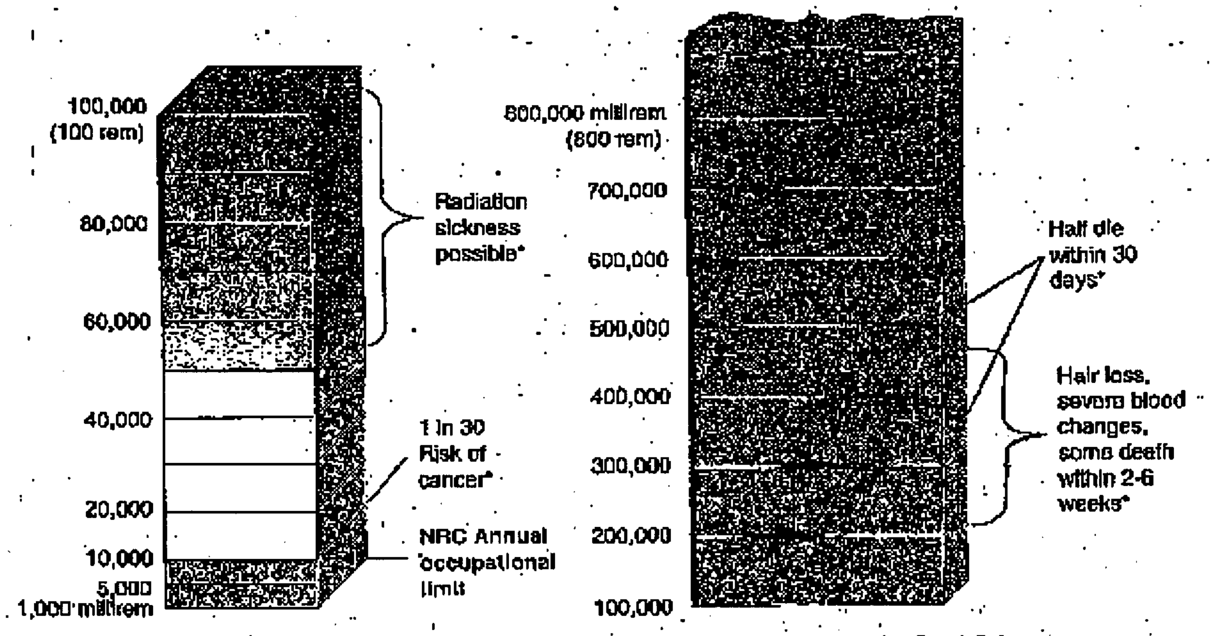
* Source: National Council on Radiation Protection (NCRP) Report 93, 1987.

December 2003


RADIATION DOSES IN PERSPECTIV
(adapted from USNRC, Office of Public Affairs Fact Sheet, "Biological Effects of Radiation", Dec. 2000
1 millirem
2
3
4
5
6
7
8
9
10
Transpolar flight
Annual dose from building materials
1-week dose in US-all sources
Chest x-ray
Trans-Atlantic flight
Leg/Arm x-ray
100 millirem
90
80
70
60
50
40
30
20
10
NRC Annual limit for the public
Annual terrestrial dose in Denver
Annual dose from medical exams
From your body
Annual cosmic rays
Annual terrestrial dose in Maryland
1000 millirem (1 rem)
900
800
700
600
500
400
300
200
100

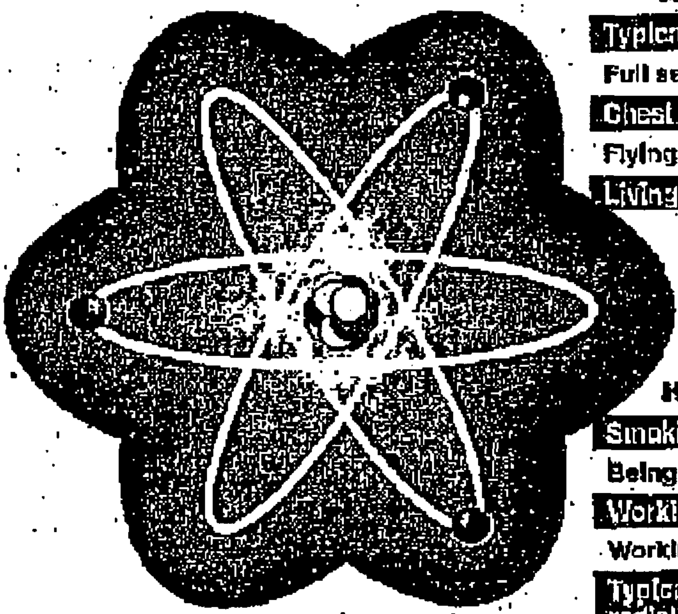
RADIATION DOSES IN PERSPECTIVE

(adapted from USNRC, Office of Public Affairs Fact Sheet, "Biological Effects of Radiation", Dec. 2000)



* Doses received over a short time period (hours to days) at high dose rates are "acute" doses

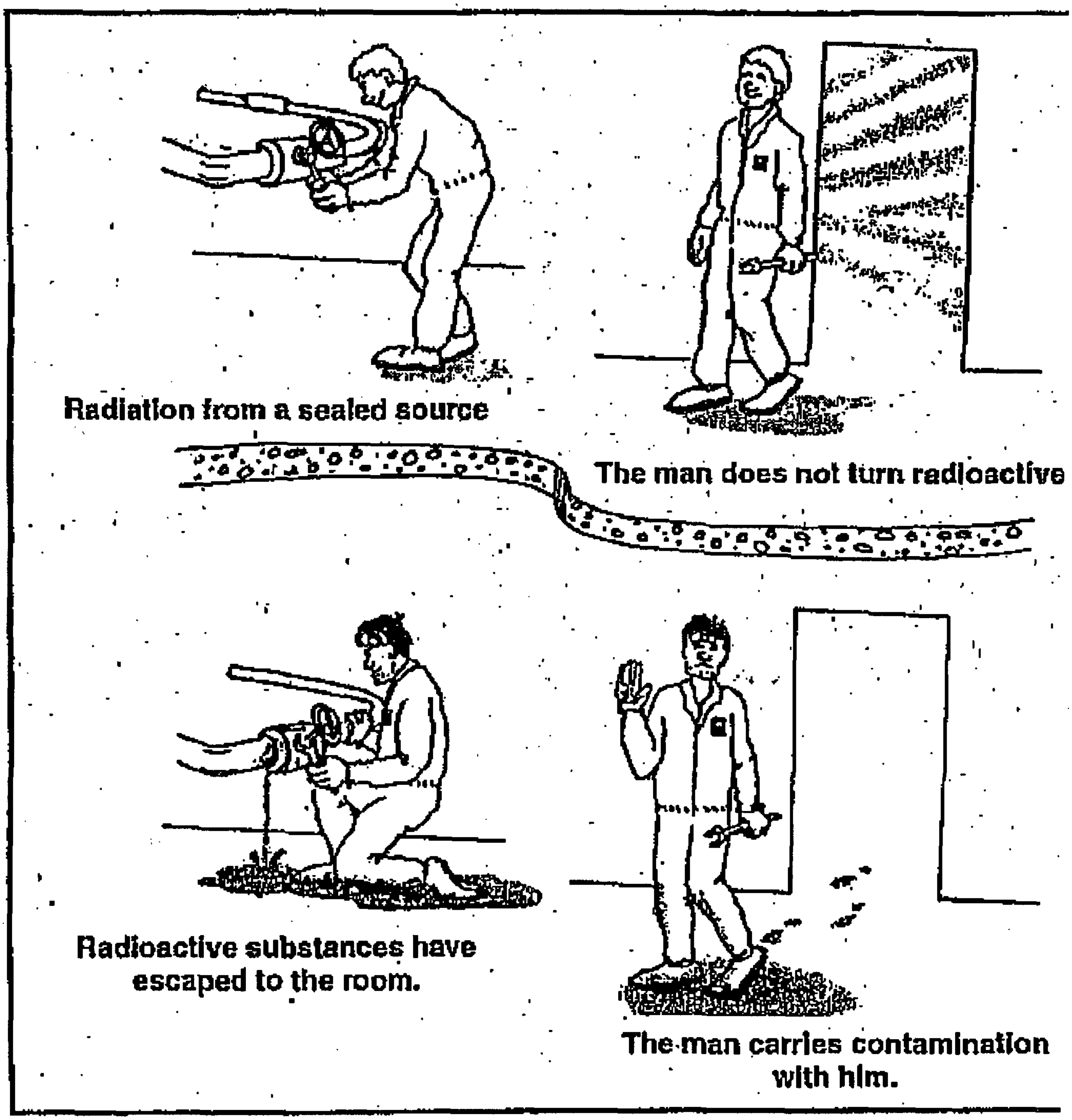
MEASURING RADIATION'S EFFECTS



Activity	Millirems
Typical yearly dose, all sources	360.00
Full set of dental X-rays	40.00
Chest X-ray	8.00
Flying round-trip from D.C. to Los Angeles	5.00
Living outside nuclear power plant for a year	0.10

Health risk	Expected life lost
Smoking a pack of cigarettes a day	6 years
Being 15 percent overweight	2 years
Working in construction	227 days
Working in nuclear plant (1,000 mrem/yr)	51 days
Typical annual background radiation dose (360 mrem/yr)	18 days

Despite the theoretical risk factors, radiation studies for almost a century and follow-up studies of hundreds of thousands of occupationally exposed workers have not revealed any adverse health effect caused by normal exposure to artificial radiation. Dose limits applied to the public are only a small fraction of those for radiation workers.



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Tuesday, June 12, 2007

Fact Sheet on Tritium, Radiation Protection Limits, and Drinkin Standards

Printable Version

Background

The U.S. Nuclear Regulatory Commission (NRC) has recently evaluated several instances of abnormal release tritium from several nuclear power plants, which resulted in groundwater contamination. The NRC determine the releases were unplanned, the levels of tritium were within radiation protection limits and did not pose a t health and safety. Nonetheless, the NRC takes these unanticipated and unmonitored releases very seriously, currently reviewing these incidents to ensure that nuclear power plant operators have taken appropriate actio

What is the NRC doing about the tritium leaks and spills at nuclear power plants

The NRC has revised its inspection procedures for nuclear power plants to evaluate licensees' programs to ins assess the equipment and structures that have the potential to leak. The NRC has also placed additional emp evaluating the licensees' abilities to analyze for additional discharge pathways, such as groundwater, as a res leak.

The NRC has established a "lessons learned" task force to address inadvertent, unmonitored liquid releases o from U.S. commercial nuclear power plants. This task force will review previous incidents, identify lessons lea these events, and determine what, if any, changes are needed in the agency's regulatory program. The task f are expected in the near future.

As with any industrial facility, a nuclear power plant may deviate from normal operation with a spill or leak of material. However, the plant design and the NRC's inspection program both provide reasonable assurance th will be met — even in abnormal situations.

This fact sheet provides a general overview of the health effects of tritium and the technical bases for the reg standards that the NRC uses to protect public health and safety, as well as the drinking water standards esta U.S. Environmental Protection Agency (EPA). Additional resources and references related to tritium are listed this fact sheet.

Tritium

- Tritium is a naturally occurring radioactive form of hydrogen that is produced in the atmosphere when collide with air molecules. As a result, tritium is found in very small or trace amounts in groundwater t world. It is also a byproduct of the production of electricity by nuclear power plants.

- Tritium emits a weak form of radiation. The radiation emitted from tritium is a low-energy beta particle to an electron. Moreover, the tritium beta particle does not travel very far in air and cannot penetrate t

Tritium from Nuclear Power Plants

- Several nuclear power plants have recently reported abnormal releases of liquid tritium, which resulted groundwater contamination (see http://www.nrc.gov/reactors/operating/ops-experience/grndwtr-cont tritium.html).

- Many power plants (nuclear and otherwise) convert heat into electricity using steam. Non-nuclear powe coal or oil to generate the heat to make steam. By contrast, nuclear power plants generate the heat to through the process of atomic fission (atom splitting). Fission occurs when the nucleus of a heavy atom uranium or plutonium, splits in two when struck by a neutron. This "fissioning" of the nucleus produces form of heat, and releases two or three new neutrons, which can then repeat the process to release ev neutrons — and more nuclear energy. The repetitive cycling of this process is called a "chain reaction."

- Most of the tritium produced in a reactor is as a byproduct of the absorption of neutrons by a chemical boron. Boron is a good absorber of neutrons, which nuclear reactors use to help control the fission chai Toward that end, boron either is added directly to the coolant water or is used in the control rods to co reaction. Tritium can also be produced (to a lesser extent) from the fission process itself, or when neut absorbed by other chemicals (e.g., lithium or heavy water) in the coolant water (NAS, 1996; UNSCEAR

- Like normal hydrogen, tritium can bond with oxygen to form water. When this happens, the resulting w "tritiated water") is radioactive. Tritiated water (not to be confused with heavy water) is chemically ide normal water and the tritium cannot be filtered out of the water.

- Nuclear power plants routinely and safely release dilute concentrations of tritiated water. These authori are closely monitored by the utility, reported to the NRC, and made available to the public on the NRC's http://www.reirs.com/effluent/ EXIT.

How do people become exposed to tritium?

- Tritium is almost always found as a liquid and primarily enters the body when people eat or drink food containing tritium or absorb it through their skin. People can also inhale tritium as a gas in the air.

- Once tritium enters the body, it disperses quickly and is uniformly distributed throughout the soft tissu tritium is excreted within approximately 10 days after exposure.

- Everyone is exposed to small amounts of tritium every day, because it occurs naturally in the environm foods we eat. Workers in Federal weapons facilities; medical, biomedical, or university research facilitie fuel cycle facilities may receive increased exposures to tritium.

Is the radiation dose from tritium any different than the dose from natural backg radioactivity or medical administrations?

- The type of radiation dose from tritium is the same as from any other type of radiation, including natur radiation and medical administrations.

- The tritium dose from nuclear power plants is much lower than the exposures attributable to natural ba radiation and medical administrations.

- Humans receive approximately 82% of their annual radiation dose from natural background radiation, medical procedures (e.g., x-rays), and 3% from consumer products. Doses from tritium and nuclear pc effluents are a negligible contribution to the background radiation to which people are normally expose account for less than 0.1% of the total background dose (NCRP, 1987).

  As an example, assume that a residential drinking water well sample contains tritium at the level of 1,6 per liter (a comparable tritium level was identified in a drinking water well near the Braidwood Station r facility). The radiation dose from drinking water at this level for a full year is characterized as follows (u assumptions):

  - at least ten thousand times lower than the dose from a medical procedure involving a full-body c tomography (CT) scan (e.g., 3,000 to 10,000 mrem from a CT scan vs. 0.3 mrem from tritiated water)

  - one thousand times lower than the dose from natural background radiation (e.g., 300 mrem fror background radiation vs. 0.3 mrem from tritiated water)

  - one hundred times lower than the dose from either dental x-rays or natural radioactivity (potass body (e.g., 30 mrem from potassium vs. 0.3 mrem from tritiated water)

- ten times lower than a round-trip cross-country airplane flight (e.g., 3 mrem from New York to L and back vs. 0.3 mrem from tritiated water)

What are the possible health risks from tritium radiation exposure?

ALARA (as low as reasonably achievable) safety principle for minimizing doses and relea radioactive material by using all reasonable me principle, no dose should be acceptable if it ca or is without benefit. [See Title 10, Section 20. *Code of Federal Regulations* (10 CFR 20.1003)

Along with other national and international regulatory agencies responsible for radiation protection, the NRC assumes that any exposure to radiation poses some health risk, and that risk increases as exposure increases in a linear, no-threshold (LNT) manner. The LNT assumptic that any increase in dose, no matter how small, incrementally increases risk. Conversely, lower levels of radia proportionately decrease the risk, such that very small radiation doses have very little risk. The health risks ir increased occurrence of cancer and genetic abnormalities in future generations. Since it is assumed that any e radiation poses some health risk, it makes sense to keep radiation doses as low as reasonably achievable (AL NRC's radiation dose limits and ALARA requirements minimize the health risk and ensure that no individual is disproportionately exposed as a result of NRC-licensed activities.

A **millirem** (mrem) is a term that scientists us how much radiation the body absorbs. For exa scientists estimate that we receive a dose of 3 every year from natural (e.g., radon) and hum (e.g., medical) radiation sources.

The NRC's dose limits for radiation workers and the general public are significantly lower than the levels of radiation exposure that cause health effects in humans — including a developing embryo or fetus. Although high doses and high dose rates may cause cancer in humans and genetic abnormalities in an embryo or fetus, public health data have not established the occurrence of these health risks following exposure to low doses and low-dose rates — be 10,000 millirem (mrem).

For comparison, the NRC calculated a maximum annual dose of less than 0.1 mrem to a member of the publi recent unintended tritium releases at the Braidwood Station. This is a very low dose, which is not considered health and safety because it is well below the NRC's 500 mrem dose limit for declared pregnant workers at nu and the 100 mrem annual dose limit for members of the general public.

For additional comparison, a typical individual in the United States receives an average annual radiation expo 300 millirem from natural sources (NCRP, 1987). Radon gas accounts for two-thirds of this exposure, while cc terrestrial, and internal radiation account for the remainder. No adverse health effects have been discerned fr arising from these levels of natural radiation exposure.

In addition, human-made sources of radiation from medical, commercial, and industrial activities contribute a mrem to our annual radiation exposure. Of these sources of exposure, medical x-rays are among the greatest and diagnostic medical procedures account for about 40 mrem each year. In addition, consumer products (su fertilizer, welding rods, gas mantles, luminous watch dials, and smoke detectors) contribute another 10 mrem radiation exposure. For more information on the health effects of radiation, visit http://www.nrc.gov/reading-collections/fact-sheets/bio-effects-radiation.html (NRC, 2004).

Radiation Protection Limits

The NRC is continuously evaluating the latest radiation protection recommendations from international and na scientific bodies to ensure the adequacy of the standards the agency uses. Among those standards, the NRC a established three layers of radiation protection limits to protect the public against potential health risks from e radioactive liquid discharges (effluents) from nuclear power plant operations. The NRC has determined that do general public from the unintended release of tritium at nuclear power plants are significantly below even the stringent layer of these protective limits and, therefore, does not pose a risk to public health and safety.

Layer 1: 3 mrem per year ALARA objective — Appendix I to 10 CFR Part 50

The NRC requires that nuclear plant operators must keep radiation doses from gas and liquid effluents as low achievable (ALARA) to people offsite. For liquid effluent releases, such as diluted tritium, the ALARA annual of objective is 3mrem to the whole body and 10 mrem to any organ

of a maximally exposed individual who lives in close proximity to the plant boundary. This ALARA objective is annual public radiation dose limit of 100 mrem.

The NRC selected the 3 mrem and 10 mrem per year values because they are a fraction of the natural backgr dose, a fraction of the annual public dose limit, and an attainable objective that nuclear power plants could m plants that meet these objectives are considered to be ALARA in reducing exposures to the general public fro power plant effluents (AEC 1971, NRC 1975).

Nuclear power plant operators must monitor the authorized releases (effluents) from their plants. If a given n plant exceeds half of these radiation dose levels in a calendar quarter, the plant operator is required to invest cause(s), initiate appropriate corrective action(s), and report the action(s) to the NRC within 30 days from th quarter.

Layer 2: 25 mrem per year standard — 10 CFR 20.1301(e)

In 1979, EPA developed a radiation dose standard of 25 mrem to the whole body, 75 mrem to the thyroid, an any other organ of an individual member of the public. The NRC incorporated these EPA standards into its reg 1981, and all nuclear power plants must now meet these requirements. These standards are specific to faciliti involved in generating nuclear power (commonly called the "uranium fuel cycle"), including where nuclear fue manufactured, and used in nuclear power reactors. EPA determined the basis of the standards by comparing t effectiveness of various dose limits in reducing potential health risks from operation of these types of facilitie assumed the standards would be able to be met for up to four fuel cycle facilities (e.g., four reactors) at one l 1976a). Notably, the NRC's ALARA objectives are lower than these EPA standards (NRC, 1980).

Layer 3: 100 mrem per year limit — 10 CFR 20.1301(a)(1)

The NRC's final layer of protection of public health and safety is a dose limit of 100 mrem per year to individu the public. This limit applies to everyone, including academic, university, industrial, and medical facilities that radioactive material.

The NRC adopted the 100 mrem per year dose limit from the 1990 Recommendations of the International Co Radiological Protection (ICRP). The ICRP is an organization of international radiation scientists who provide recommendations regarding radiation protection-related activities, including dose limits. These dose limits are implemented by governments worldwide as legally enforceable regulations. The basis of the ICRP recommend mrem per year is that a lifetime of exposure at this limit would result in a very small health risk and is roughl background radiation from natural sources (excluding radon) (ICRP, 1991). Thus, the ICRP equated 100 mre the risk of riding public transportation — a risk the public generally accepts (ICRP, 1977). The U.S. National C Radiological Protection and Measurements (NCRP) also recommends the dose limit of 100 mrem per year (NC

For liquid effluents, including tritiated water, any licensee can demonstrate compliance with the 100 mrem pe standard by not exceeding the concentration values specified in Table 2 of Appendix B to 10 CFR Part 20. The concentration values, if inhaled or ingested over the course of a year, would produce a total effective dose of

Drinking Water Standards

Under the authority of the Safe Drinking Water Act, EPA sets the Federal legal limits for contaminants in drink These limits are called maximum contaminant levels, and water suppliers must provide water that meets thes EPA's drinking water standards do not apply to private drinking water wells, such as those that may be impac that is inadvertently released from nuclear power plants. However, many State authorities have adopted the l water standards as legally enforceable groundwater protection standards, and those standards are often used laboratory test results of water from private wells. For more information on drinking water and health, visit http://www.epa.gov/safewater/dwh/index.html EXIT (EPA, 2006a).

Picocurie (pCi) is a term that scientists use to how much radiation and, therefore, how much the water. A pCi is a unit that can be directly n laboratory tests.

In 1976, EPA established a dose-based drinking water standard of 4 mrem per year to avoid the undesirable future contamination of public water supplies as a result of controllable human activities. In so doing, EPA set a maximum contaminant level of 20,000 picocuries per liter (pCi/L) for tritium. This level is assumed to yield a dose of 4 mrem per year. If other similar radioactive mate present in the drinking water, in addition to tritium, the sum of the annual dose from all radionuclides shall n mrem per year. Water treatment plant operators use this drinking water standard, along with monitoring requ remain vigilant regarding the amount of radioactivity in drinking water and provide a means to gauge if the c contaminants in finished drinking water is increasing or decreasing over time. This standard was expected to only in extraordinary circumstances (EPA, 1975; EPA, 1976b).

Since EPA developed the 1976 drinking water standard, scientists have improved the calculation methods to e concentrations of tritium in drinking water (pCi/L) to radiation doses in people (mrem). In 1991, EPA calculate concentration to yield a 4 mrem per year dose as 60,900 pCi/L — a threefold increase from the maximum cor of 20,000 pCi/L established in 1976. However, EPA kept the 1976 value of 20,000 pCi/L for tritium in its lates For more information on the basis and history of the Radionuclide Rule, visit http://www.epa.gov/safewater/r EXIT (EPA, 2006b).

Additional Tritium Resources

- U.S. NRC: http://www.nrc.gov/reactors/operating/ops-experience/grndwtr-contam-tritium.html
- U.S. EPA: http://www.epa.gov/radiation/radionuclides/tritium.htm EXIT
- U.S. DOE (Argonne National Lab): http://www.ead.anl.gov/pub/doc/tritium.pdf EXIT
- California EPA: http://www.oehha.ca.gov/water/phg/allphgs.html EXIT (Scroll down and click on Tritiu
- University of Idaho: http://www.physics.isu.edu/radinf/tritium.htm EXIT

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