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US Army Corps of Engineers

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FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM
Buffalo District, U.S. Army Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207-3199

For Immediate Release
January 5, 1998

Contact: Nancy J. Sticht
[redacted]

CORPS OF ENGINEERS TO DISCUSS ENVIRONMENTAL ISSUES AT THE NIAGARA FALLS STORAGE SITE

BUFFALO -- The Buffalo District of the Army Corps of Engineers, will hold a community meeting Monday, January 12, 1998, at 7 p.m. in the Lewiston Town Hall at 1375 Ridge Road in Lewiston, to discuss environmental issues at the Niagara Falls Storage Site. This site has stored low-level radioactive material from past government activities.

Corps leaders will talk about the site and listen to community concerns.

The 191-acre Niagara Falls Storage Site is located at 1397 Pletcher Road in Lewiston, 10 miles north of Niagara Falls. It contains a few buildings and an engineered cell containing approximately 250,000 cubic yards of radiologically contaminated soils which includes about 4,000 cubic yards of radium-bearing residues.

In October, Congress transferred management of remediation at this and other former Department of Energy sites to the Corps of Engineers. The program, called FUSRAP (Formerly Utilized Sites Remedial Action Program) provides for study of these former sites and action to remediate environmental problems. Buffalo District now manages this site and several other sites in New York and Ohio.

FUSRAP was created in 1974 to study sites used as part of the nation's atomic energy program. These early sites were decontaminated under guidelines in effect during that period. Using today's more-stringent environmental laws and better technology, the Corps of Engineers will address these environmentally damaged sites.

--30--

NIAGARA FALLS STORAGE SITE

US Army Corps of Engineers®

COMMUNITY MEETING

January 12, 1998

7 to 9 p.m.

Lewiston Town Hall

1375 Ridge Road

You are invited to meet the leadership of the Buffalo District of the U.S. Army Corps of Engineers and discuss your concerns about the Niagara Falls Storage Site, one of the sites in the Formerly Utilized Site Remedial Action Program (FUSRAP).

You are encouraged to attend this community meeting and to participate in the decision-making process for the Niagara Falls Storage Site.

For more information, call the FUSRAP Public Information Center at (716) 871-9660.

William F. Jerge

of the City of Buffalo, New York, being duly sworn, deposes and says that he/she is Principal Clerk of THE BUFFALO NEWS, DIV. OF BERKSHIRE HATHAWAY, INC., Publisher of the BUFFALO NEWS, a newspaper published in said city, that the notice of which the annexed printed slip taken from said newspaper is a copy, was inserted and published therein 1 time, the insertion being on the 11TH day of JANUARY, 1998.

William F. Jerge

Date Ad Ran: 1/11/98

of JANUARY, 1998

Marilynn J. Calhoun

Notary Public, Erie County, New York

MARILYNN J. CALHOUN
NOTARY PUBLIC, STATE OF NEW YORK
NO. 5012462
CERTIFIED IN ERIE COUNTY
MY COMMISSION EXPIRES JUNE 15, 1999

US Army Corps of Engineers

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AROUND NIAGARA THIS WEEK

▶ LEWISTON

Meeting to address issues concerning waste site

The Buffalo District of the Army Corps of Engineers will meet at 7 p.m. today in Lewiston Town Hall, 1375 Ridge Road.

The meeting is being held to discuss environmental issues concerning the Niagara Falls Storage Site, 1397 Pletcher Road, Lewiston.

The 191-acre storage site has stored low-level radioactive material for decades, and now is comprised of a few buildings and an engineered cell that contains about 250,000 cubic yards of contaminated soils.

In October, Congress transferred management of the site and its cleanup from the Department of Energy to the Corps of Engineers.

WHAT'S AHEAD

PUBLIC MEETINGS THIS WEEK

What	When	Where	Agenda
Niagara Falls City Council	4 p.m. today	City Hall, 745 Main St.	Committee-of-the-whole
Niagara Falls City Council	7 p.m. today	City Hall, 745 Main St.	Regular meeting
Porter Town Board	6:50 p.m. today	Town Hall, 3265 Creek Road	Public hearing, followed by regular meeting
Wheatfield Town Board	7 p.m. today	Town Hall, 2800 Church St.	Regular meeting
U.S. Army Corps of Engineers	7 p.m. today	Lewiston Town Hall, 1375 Ridge Road	Public hearing on Pletcher Road waste site
Lewiston-Porter Board of Education	6:45 p.m. Wednesday	Primary building, Creek Road	Regular meeting
Niagara Falls Planning Board	6 p.m. Wednesday	City Hall, 745 Main St.	Regular meeting
Niagara Falls Board of Education	5:30 p.m. Thursday	Board Room, 606 Sixth St.	Agenda review
Niagara Town Board	7 p.m. Thursday	Town Hall, 7105 Lockport Road	Work session

Niagara Gazette

US Army Corps of Engineers®

FUSRAP Fact Sheet

Radiation

U.S. Army Corps of Engineers • Buffalo District

The Formerly Utilized Sites Remedial Action Program (FUSRAP) was initiated by the Atomic Energy Commission in 1974 to identify and clean up contaminated sites used in the early years of the nation's atomic energy program. Management of the program was transferred to the U.S. Army Corps of Engineers from the U.S. Department of Energy in October 1997. This is one in a series of fact sheets that provide information about regulatory, technical, and other issues considered in decision making within the Formerly Utilized Sites Remedial Action Program (FUSRAP). This fact sheet discussed low-level radiation: what it is and how it is measured.

What is radioactivity?

Simply put, radioactivity is a process in which an atom's nucleus spontaneously disintegrates, or "decays," and releases energy. The rate of decay is called the "activity," and is measured as the number of disintegrations per second.

Many isotopes in nature are stable, which means they never change. Other isotopes — both natural and manmade — are radioactive, meaning that they are unstable and can change into another form. For example, uranium is composed of two main isotopes that have mass numbers of 235 and 238. Uranium-238 decays to thorium-234 and an alpha particle. And Radium-226 decays to radon-222 and an alpha particle.

The decay of radium to radon is one step in a long radioactive process, starting with Uranium-238 and ending, ultimately, with lead. The rates of decay vary, ranging from a fraction of a second to billions of years, depending on the isotope. It is measured in half-lives, or the time it takes for half of the radioactive atoms in a radionuclide to decay to another form. Radium-222, for example, has a half-life of 1,599 years. Radon-222, though, has a half-life of 3.82 days.

What are the types of radiation?

The term "radiation" is very broad, and includes visible, infrared and ultraviolet light and radio waves. However, it is most often used to mean "ionizing" radiation: radiation that changes the physical state of atoms it strikes, causing them to become electrically charged or "ionized." In some circumstances, the presence of such ions in living tissues can disrupt normal biological processes. Ionizing radiation may therefore represent a health hazard to man.

There are various types of ionizing radiation, and each has different characteristics:

- *Alpha radiation* consists of heavy positively charged particles emitted by atoms of elements such as uranium and radium. Alpha radiation may just penetrate the surface of the skin, and it can be stopped completely by a sheet of paper. However, if alpha-emitting materials are ingested or inhaled, they can expose internal tissues directly and be a potential hazard.
- *Beta radiation* consists of electrons. These are more penetrating than alpha particles, requiring a sheet of aluminum a few millimeters thick to stop them completely. Tritium, which is present in fallout from nuclear tests, is a source of beta radiation.
- *Gamma rays* are a form of electromagnetic radiation, similar to X-rays, light and radio waves. They can be very penetrating, and can pass right through the human body. But they are almost completely absorbed by one meter of concrete.
- *X-rays* are a more familiar form of electromagnetic radiation, with limited penetrating power. X-rays generally are focused into a beam, and lead stops their penetration.
- *Neutrons,* which are released during processes such as the splitting of atoms in the fuel of nuclear power plants, also can be very penetrating. But efficient shielding against neutrons can be provided by water.

Some exposure to ionizing radiation cannot be avoided. Exposures can be natural or man-made. Natural sources include cosmic rays and naturally-occurring radionuclides in the earth and air, and are considered "background" radiation. Man-made sources include medical X-rays and coal-fired power plants. Other sources of radiation include fallout from nuclear explosives testing and radionuclides emitted from nuclear installations in the course of normal operation.

What is a radiation dose?

The term "dose" describes the amount of radiation or energy transmitted to cells. Sunlight, for example, feels warm because its energy is absorbed by the body. The amount of radiation and the type absorbed are easily measured using instruments, and the biological effect of absorbing a given amount of radiation varies, depending on its type.

Dose equivalent is the term used to express the amount of effective radiation received by an individual. A dose equivalent considers the type of radiation, the amount of body exposed, and the risk of exposure. It is measured in Roentgen equivalent man units (or rems) to measure the amount of damage to human tissue from a dose of ionizing radiation.

How do we protect against radiation exposure?

Radioactive particles can enter the body by ingestion – by eating, drinking and breathing. When a particle of radiation penetrates the human body and passes through and out without interacting with bodily tissue, no damage is inflicted. It is when the particles deposit some of their energy in tissue that damage could occur. To protect against a radiation hazard, it is necessary to isolate the source of radioactivity or to render it harmless. At present there is no way to eliminate radioactivity through treatment, but there are measures that can be taken.

To provide protection against radiation that is external to the body, three factors can be used: *distance, time,* and *shielding.* A person is safer the farther from the source of radiation, the shorter the time of exposure and the thicker the shielding. Exposure to radiation from wastes is prevented by using protective containers and shielding, and by isolation of the radioactive material.

Approaches to radiation protection are similar throughout the world because most governmtnes have accepted the recommendations of the International Commission on Radiological Protection, an independent group of experts. One of the commission's priciples is "As Low as Reasonably Achievable" (ALARA), which is the practice of keeping all doses as low as possible. In recommending maximum dose limits, the commission also recoginzes two categories of people: adults exposed throught their work and members of the public.

In this country, these exposure limits are found in Code of Federal Regulations 10 Energy, Part 20. The document, which is reissued annually, includes regulations of the Nuclear Regulatory Commission, which are based on specifications of the U.S. Environmental Protection Agency.

The maximum occupational dose is 5 rems per year, although somewhat higher limits are allowed for the lens of the eye and the skin, hands, and feet (15 and 50 rems per year, respectively). For the general public, the limits are 0.1 rem (100 millirems) per year.

How do I get more information?

For more information about radiation or other FUSRAP issues, pease contact the FUSRAP Public Information Center at (716) 871-9660. Or call the 24-hour, toll-free telephone number. An answering machine records comments or questions, and all calls are returned. The number is (800) 833-6390.

Or visit the FUSRAPhomepage on the World Wide Web at: ***http://www.fusrap.doe.gov***

References and Further Reading

Understanding Radioactive Waste, 4th Edition, Raymond L. Murray, Battelle Press, 1994
Facts About Low-Level Radiation, American Nuclear Society, 1989
Radiation — A Fact of Life, American Nuclear Society, 1989
Toxics A to Z: A Guide to Everyday Pollution Hazards, John Harte, Cheryl Holdren, Richard Schneider and Christine Shirely, University of California Press, 1991

US Army Corps of Engineers®

FUSRAP Fact Sheet

Niagara Falls Storage Site Lewiston, New York

U.S. Army Corps of Engineers, Buffalo District • November 1997

The Formerly Utilized Sites Remedial Action Program (FUSRAP) was initiated by the Atomic Energy Commission in 1974 to identify and clean up contaminated sites used in the early years of the nation's atomic energy program. Management of the program was transferred to the U. S. Army Corps of Engineers from the U. S. Department of Energy in October 1997.

Site Description and History

The Niagara Falls Storage Site (NFSS) is located on part of the former Lake Ontario Ordnance Works, a site developed for producing explosives during World War II, in the Township of Lewiston (Niagara County) in northwestern New York, about 19 miles northwest of Buffalo.

In 1944 this part of the facility was used by the Manhattan Engineer District for storing radioactive residues and wastes from uranium ore processing conducted during development of the atomic bomb. Radioactive residues and wastes continued to be brought to the site for storage until the late 1950s. Some of these radioactive materials spread through erosion to drainage ditches and other areas of the site. The structures on the 190-acre site are a three-story building with three adjacent silos, an office building, a small storage shed, and a storage building. Radioactive wastes and residues are stored in a clay-capped, grass-covered containment structure that occupies about 10 acres. Current site activities involve the surveillance and maintenance of the containment structure.

In 1982 the U.S. Department of Energy (DOE) began cleaning up the site and nearby areas. These initial efforts included construction of the earthen containment structure to effectively control the radioactive residues and wastes. During construction, the residues, which are more radioactive than the wastes, were placed in a reinforced concrete building foundation at the bottom of the waste containment structure. The radioactive soils and debris from cleanup of the drainage ditches and other contaminated areas were then placed on top of the residues.

Construction of the containment structure was completed in 1986. In 1991, in an effort to clean up all remaining radioactive materials above guidelines at the site, about 3,000 cubic yards of contaminated material was added to the structure. Isolated areas of contamination in Buildings 401 and 403 are scheduled to be cleaned up in Fiscal Year 1998.

Long-Term Management of Radioactive Residues and Wastes

The containment structure at NFSS was built to control existing hazards for at least 25 years, but the radioactivity in the stored materials will last thousands of years. Therefore a strategy had to be devised for long-term waste management that considers environmental, engineering, and cost issues.

In 1986, DOE prepared environmental documentation that evaluated and compared several alternatives for long-term waste management. Public comments were sought during the development of this report through a series of meetings. A series of meetings were held in 1983 before work began at the site, and again when the first draft of the proposed site remedy was published in 1984. Another round of meetings with interested and affected parties was conducted when the draft document was finalized.

As DOE held discussions with stakeholders about the various alternatives for long-term waste management at the Niagara Falls Storage Site, it became clear that other options needed to be evaluated. The National Acadamy of Science has issued a report called "Safety of the High-Level Uranium Ore Residues at the Niagara Falls Storage Site, Lewiston, New York, that recommends removal, treatment, and disposal off-site of the NFSS high-level residues. The evaluation of alternatives is continuing, and subsequent reports will be available for public review and comment.

For More Information

For more information, please call the FUSRAP 24-hour, toll-free public access line. Your call will be returned promptly. FUSRAP also has a home page on the Internet.

Toll-free Telephone Number: 1-800-253-9759

Home Page Address: http://www.fusrap.doe.gov/

Please let us know if you would like to be included on the mailing list for Niagara Falls Storage Site. You may also contact the:

U. S. Army Corps of Engineers
FUSRAP Public Information Center
70 Pearce Avenue
Tonawanda, NY 14150

(716) 871-9660

This fact sheet is printed on recycled/recyclable paper.

US Army Corps of Engineers®

FUSRAP Fact Sheet

Radioactivity in Common Products

U.S. Army Corps of Engineers • Buffalo District

This is one in a series of fact sheets that provide information about regulatory, technical, and other issues considered in decision-making within the Formerly Utilized Sites Remedial Action Program (FUSRAP). This fact sheet discusses how some common household products contain radioactivity.

Around the House

Many household products contain a small amount of radioactivity. Examples include gas lantern mantles, smoke detectors, dentures, camera lenses, and anti-static brushes. The radioactivity is added to the products either specifically to make them work, or as a result of using compounds of elements like thorium and uranium in producing them. The amount of radiation the products gives off is not considered significant. But with today's sensitive equipment, it an be detected.

Lanterns: In a New Light

About 20 million gas lantern mantles are used by campers each year in the United States.

Under today's standards, the amount of natural radioactivity found in a lantern mantle would require precautions in handling it at many Government or industry sites. The radioactivity present would contaminate 15 pounds of dirt to above allowable levels. This is because the average mantle contains 1/3 of a gram of thorium oxide, which has a specific activity (a measure of radioactivity) of approximately 100,000 picocuries per gram. The approximately 35,000 picocuries of radioactivity in the mantle would, if thrown onto the ground, be considered low-level radioactive contamination.

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FUSRAP Fact Sheet

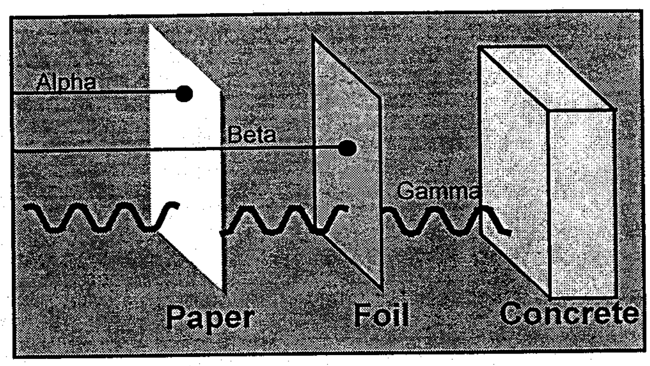
Radiation at FUSRAP Sites

U.S. Army Corps of Engineers • Buffalo District

This is one in a series of fact sheets that provides information about regulatory, technical, and other issues considered in decision-making within the Formerly Utilized Sites Remedial Action Program (FUSRAP). This fact sheet discusses the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or Superfund. The Department of Defense's hazardous waste cleanup activity responsibilities are derived from CERCLA; the Resource Conservation and Recovery Act (RCRA); state and local requirements; standards, and guidance documents.

The Nature of Radiation

Radiation is a naturally occurring type of energy. It is released by unstable forms of atoms, the basic units of matter, as they change into more stable forms. The energy released is emitted as waves or particles.



- Alpha particles are the largest and slowest atomic particles. They can travel only a few inches through air. They can be stopped by a sheet of paper or the outer layers of skin.

- Beta particles are smaller and faster than alpha particles but can travel only about 10 feet through air. They can easily be stopped by a thin shield such as a sheet of aluminum foil.

- Gamma radiation consists of gamma rays rather than atomic particles. Gamma rays are a type of electromagnetic wave, much like X rays, and move at the speed of light. They travel farther through air than alpha or beta particles but can be stopped by a thick shield of lead, steel, or concrete.

Radiation cannot be seen, heard, smelled, or tasted. However, it can be detected and measured by instruments such as Geiger counters, dosimeters, and similar devices. Levels of radiation are expressed in several different units. One of the most useful is the rem, which measures radiation dose in terms of its potential health effects on persons who might be exposed to it.

Small amounts of radiation dose are expressed in millirems (thousandths of a rem), abbreviated as mrem. For example, a chest X ray produces a dose of about 40 mrem, a back X ray about 3,000 mrem, and a dental X ray about 150 mrem.

The amount of radiation that can leave the boundaries of FUSRAP sites is kept to levels as low as reasonably achievable. The exposure a member of the general public can receive as a result of radiation from FUSRAP sites is very low. The maximum allowable exposure is 100 mrem per year above background levels. By comparison, the average American receives about 360 mrem per year from background radiation and medical exposure.

Sources of Radiation

Sources of radiation include the soil and the food we eat. It also reaches us as cosmic radiation from outer space. For example, a resident of Denver, Colorado, receives about 50 mrem per year from cosmic radiation and another 63 mrem per year from the ground surface. Food accounts for about 20 mrem of our annual radiation exposure.

Natural and synthetic substances that emit radiation are called radioactive materials. Many buildings contain naturally occurring radioactive materials. For example, radioactive elements in the granite in the U.S. Capitol Building emit radiation producing an exposure of about 85 mrem per year. The human body itself contains substances that contribute about 11 percent of the average annual radiation exposure.

Some consumer products are also sources of radiation. A person who smokes two packs of cigarettes per day receives 8,000 mrem per year. Smoke detectors produce about 1/100 mrem per year. Certain household appliances such as color television sets and microwave ovens also produce very small amounts of radiation. On the average, consumer products account for about 3 percent of our annual exposure.

Radioactive Materials at FUSRAP Sites

During the early years of the nation's atomic energy program, many sites were used by the Manhattan Engineer District and the Atomic Energy Commission [forerunners of the Department of Energy (DOE)] for processing and storing radioactive materials. Congress later authorized DOE to clean up the radioactive material at these sites. In October 1997, Congress transferred FUSRAP to the U.S. Army Corps of Engineers.

Several sites with industrial contamination similar to that produced by MED or AEC activities have also been added to FUSRAP by Congress. The radioactive residues at FUSRAP sites consist mostly of forms of the elements uranium, thorium, and radium that emit low levels of radiation. FUSRAP was established to ensure that the public and the environment are not exposed to potentially harmful levels of radiation from these sites. The goal of FUSRAP is to clean up or contain the radioactive material so that the sites may be released for appropriate future use.

FUSRAP Radiation Protection

The first step in FUSRAP radiation protection is to determine the levels of radioactivity at the site and in surrounding areas. Air, water, soil, or other routes by which radioactive materials could spread are identified and monitored. At many sites, access restrictions minimize exposure of the public to radioactive materials. Proper storage methods keep contaminants from leaving the site through water or soil. Materials that emit gamma radiation are found in very small amounts at FUSRAP sites and decay more rapidly than materials emitting alpha and beta particles. The radiation produced by gamma-emitting materials decreases over time. FUSRAP provides protection by isolating and shielding them while they decay.

How do I get more information?

To learn more about radiation and other aspects of the Formerly Utilized Sites Remedial Action Program, please contact the U.S. Army Corps of Engineers FUSRAP Public Information Center at (716) 871-966. Or you may call the FUSRAP 24-hour, toll-free public access line at (800) 833-6390.

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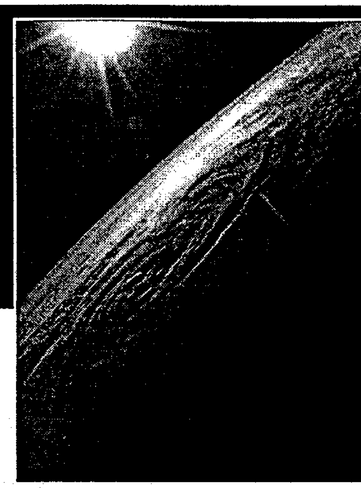
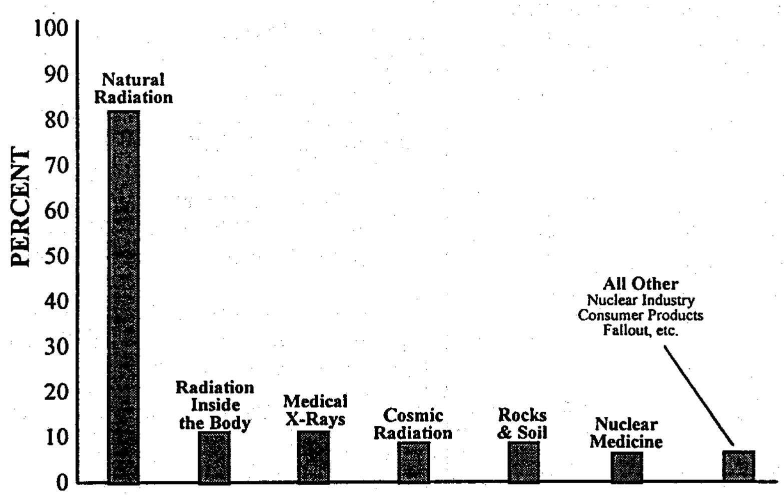
Radiation in the Environment



Radiation is a natural part of our environment. When our planet was formed, radiation was present — and radiation surrounds it still. Natural radiation showers down from the distant reaches of the cosmos and continuously radiates from the rocks, soil, and water on the Earth itself.

During the last century, mankind has discovered radiation, how to use it, and how to control it. As a result, some manmade radiation has been added to the natural amounts present in our environment.

Many materials — both natural and manmade — that we come into contact with in our everyday lives are radioactive. These materials are composed of atoms that release energetic particles or waves as they change into more stable forms. These particles and waves are referred to as *radiation*, and their emission as *radioactivity*.



As the chart on the left shows, most environmental radiation (82%) is from natural sources. By far the largest source is radon, an odorless, colorless gas given off by natural radium in the Earth's crust. While radon has always been present in the environment, it's significance is better understood today. Manmade radiation — mostly from medical uses and consumer products — add about 18% to our total exposure.

Types of Ionizing Radiation

Radiation that has enough energy to disturb the electrical balance in the atoms of substances it passes through is called ionizing radiation. There are three basic forms of ionizing radiation.

Alpha

Alpha particles are the largest and slowest moving type of radiation. They are easily stopped by a sheet of paper or the skin Alpha particles can move through the air only a few inches before being stopped by air molecules. However, alpha radiation is dangerous to sensitive tissue inside the body.

Beta

Beta particles are much smaller and faster moving than alpha particles. Beta particles pass through paper and can travel in the air for about 10 feet. However, they can be stopped by thin shielding such as a sheet of aluminum foil.

Gamma

Gamma radiation is a type of electromagnetic wave that travels at the speed of light. It takes a thick shield of steel, lead, or concrete to stop gamma rays. X-rays and cosmic rays are similar to gamma radiation. X-rays are produced by manmade devices; cosmic rays reach Earth from outer space.

Units of Measure

Radiation can be measured in a variety of ways. Units of measure show either (1) the total amount of radioactivity present in a substance or (2) the level of radiation being given off.

The radioactivity of a substance is measured in terms of the number of transformations (changes into more stable forms) per unit of time. The *curie* is the standard unit for this measurement and is based on the amount of radioactivity contained in 1 gram of radium. The amounts of radioactivity that people normally work with are in the millicurie (one-thousandth of a curie) or microcurie (one-millionth of a curie) range. Levels of radioactivity in the environment are in the picocurie or pCi (one trillionth) range.

Levels of radiation are measured in various units. The level of gamma radiation in the air is measured by the *roentgen*. This is a relatively large unit, so measurements are often calculated in milliroentgens. Radiation absorbed by humans is measured in either *rad* or *rem*. The *rem* is the most descriptive because it measures the ability of the specific type of radiation to do damage to biological tissue. Typical measurements will often be in the millirem (*mrem*), or one-thousandth of a rem, range.

Radiation in the Environment

Cosmic Radiation

Cosmic radiation is high-energy gamma radiation that originates in outer space and filters through our atmosphere.

Sea Level............................26 mrem/year
Atlanta (1,050 ft)................. 31 mrem/year
Denver (5,300 ft)..................50 mrem/year
Minneapolis (815 ft.............30 mrem/year
Salt Lake (4,000 ft).............46 mrem/year

Terrestrial Radiation

Terrestrial sources are naturally radioactive elements in the soil and water such as uranium, radium, and thorium. Average levels of these elements are 1 pCi/g of soil.

U.S. (average).....................26 mrem/year
Denver, CO..........................63 mrem/year
Nile Delta, Egypt................350 mrem/year
Paris, France......................350 mrem/year
Kerala, India.......................400 mrem/year
McAlpe, Brazil.................2,448 mrem/year
Pocos de Caldas, Brazil.................7,000 mrem/year

Buildings

Many building materials, especially granite, contain naturally radio-active elements.

U.S. Capitol Bldg.................85 mrem/year
Statue of Liberty................325 mrem/year
Grand Central Sta..............525 mrem/year
The Vatican.......................800 mrem/year

Radon

Radon levels in buildings vary, depending on geographic location, from 0.1 to 200 pCi/liter.

Average indoor radon levels....1.5 pCi/liter
Occupational working limit...100.0 pCi/liter

Because the radioactivity of individual samples varies, the numbers given here are approximte or represent an avaerage. They are shown to provide a perspective for concentrations and levels of radioactivity rather than dose.

mrem = millirem
pCi = picocurie

Food

Food contribues an average of 20 mrem/year, mostly from potassium-40, carbon-14, hydrogen-3, radium-226, and thorium-232.

Beer.......................................390 pCi/liter
Tap Water................................20 pCi/liter
Milk....................................1,400 pCi/liter
Salad Oil.............................4,900 pCi/liter
Whiskey..............................1,200 pCi/liter
Brazil Nuts.................................14 pCi/g
Bananas.......................................3 pCi/g
Flour...0.14 pCi/g
Peanuts & Peanut Butter...........0.12 pCi/g
Tea..0.40 pCi/g

Medical Treatment

The exposures from medical diagnoses vary widely according to the required procedure, the equipment, and film used for X-rays, and the skill of the operator.

Chest X-Ray.............................. 10 mrem
Dental X-Ray.............................100 mrem

Consumer Goods

Cigarettes-2 packs/day...8,000 mrem/year (polonium-210)
Color Television................. <1 mrem/year
Gas Lantern Mantle...............2 mrem/year (thorium-232)
Highway Construction.......... 4 mrem/year
Airplane Travel-39,000 ft....0.5 mrem/year (cosmic)
Natural Gas/Heating and Cooking (radon-222)..............2 mrem/year
Phosphate Fertilizers............4 mrem/year

Natural Radioactivity in Florida Phosphate Fertilizers (in pCi/gram)

	xxxxx	xxxxx	xxxxx
Ra-226	21.3	21.0	33.0
U-238	20.1	58.0	6.0
Th-230	18.9	48.0	13.0
Th-232	0.6	1.3	0.3

Porcelain Dentures.........1,500 mrem/year (uranium)
Radioluminescent Clock......<1 mrem/year (promethium-147)
Smoke Detector................0.01 mrem/year (americium-241)

International Nuclear Weapons Test Fallout

From pre-1980 atmospheric tests

(average for a U.S. citizen.....1 mrem/year

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FUSRAP Fact Sheet

How Big is a Picocurie?

U.S. Army Corps of Engineers • Buffalo District

This is one in a series of fact sheets that provide information about regulatory, technical, and other issues considered in decision-making within the Formerly Utilized Sites Remedial Action Program (FUSRAP). This fact sheet discusses how radiation is measured.

The *curie* is a standard measure for the intensity of radioactivity contained in a sample of radioactive material. It was named after French scientists Marie and Pierre Curie for their landmark research into the nature of radioactivity.

The basis for the curie is the radioactivity of one gram of radium. Radium decays at a rate of about 2.2 trillion disintegrations ($2.2x10^{12}$) per minute. A *picocurie* is one trillionth of a curie. Thus, a picocurie (abbreviated as pCi) represents 2.2 disintegrations per minute.

To put the relative size of one trillionth into perspective, consider that if the Earth were reduced to one trillionth of its diameter, the "picoEarth" would be smaller in diameter than a speck of dust. In fact, it would be six times smaller than the thickness of a human hair.

The difference between the curie and the picocurie is so vast that other metric units are used between them. These are as follows:

Millicurie	=	1/1,000 (one thousandth) of a curie
Microcurie	=	1/1,000,000 (one millionth) of a curie
Nanocurie	=	1/1,000,000,000 (one billionth) of a curie
Picocurie	=	1/1,000,000,000,000 (one trillionth) of a curie

The following chart shows the relative differences between the units and gives analogies in dollars. It also gives examples of where these various amounts of radioactivity could typically be found. The number of disintegrations per minute has been rounded off for the chart.

Unit of Radioactivity	Symbol	Disintegrations per Minute	Dollar Analogy	Examples of Rad. Materials
1 Curie	Ci	2 trillion	2 times the annual federal budget	Nuclear Medicine Generator
1 Millicurie	mCi	2 Billion	Cost of a new inter-state highway from Atlanta to San Francisco	Amount used for a brain or liver scan
1 Microcurie	µCi	2 Million	All-Star baseball player's salary	Amount used in thyroid tests
1 Nanocurie	nCi	2 Thousand	Annual home energy costs	Consumer products
1 Picocurie	pCi	2	Cost of a hamburger and Coke	Background environment levels

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FUSRAP Fact Sheet
CERCLA/Superfund

U.S. Army Corps of Engineers • Buffalo District

This is one in a series of fact sheets that provides information about regulatory, technical, and other issues considered in decision-making within the Formerly Utilized Sites Remedial Action Program (FUSRAP). This fact sheet discusses the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or Superfund. The Department of Defense's hazardous waste cleanup activity responsibilities are derived from CERCLA; the Resource Conservation and Recovery Act (RCRA); state and local requirements; standards, and guidance documents.

What is CERCLA?

CERCLA (or Superfund, as it is more commonly known) was passed in December 1980 in response to the discovery in the late 1970s of a large number of abandoned, leaking hazardous waste dumps that posed a serious threat to both human health and the environment. CERCLA was designed to impose cleanup and reporting requirements on the private sector, as well as federal facilities, by:

- identifying those sites where releases of hazardous substances had occurred or might occur, and pose a serious threat to human health, welfare, or the environment;
- taking appropriate action to remedy those releases; and
- seeking that the parties responsible for the releases pay for the cleanup activities.

It is important to note that, unlike other environmental laws, CERCLA is a response and reporting act rather than an extensive regulatory act. However, CERCLA responsibilities do overlap with the Resource Conservation and Recovery Act (RCRA), the Clean Water Act, the Clean Air Act, and the Safe Drinking Water Act.

CERCLA has two elements: response actions and the Superfund Amendments and Reauthorization Act (SARA), which includes the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the Community Right-to Know Act. The original National Contingency Plan (1985) detailed the specific steps involved in cleanup activities, but after the passage of SARA, it also set applicable or relevant and appropriate requirements for remedial action. The National Contingency Plan revision also requires the Environmental Protection Agency to maintain the National Priorities List, a list of the nation's most environmentally contaminated sites.

CERCLA and RCRA share authority with respect to underground storage tanks containing petroleum products and hazardous substances. Guidelines for these tanks are contained in Subtitle I of the 1984 Hazardous and Solid Waste Amendments to RCRA, but the types of waste regulated are outlined by CERCLA.

What does CERCLA do?

CERCLA authorizes cleanup responses when there is a release or threat of a release of a hazardous substance into the environment and sets a framework for accomplishing those actions. Two types of response actions are authorized: removal and remedial action. Removal actions are undertaken to immediately abate, prevent, minimize, stabilize, mitigate or eliminate the release or threatened release that may pose a threat to public health or welfare or the environment. Such events concern not only listed hazardous substances but also any pollutants or contaminants with the exception of oil and gas. Remedial actions provide a more permanent solution to hazardous substance threats and generally involve a more extensive study and action period.

In many cases, the United States Environmental Protection Agency (USEPA) attempts to identify the party(s) responsible for the contamination before taking any response actions itself.

Responsible parties can be any of the following: past and present site owners; generators of hazardous substances found at the site; or transporters of hazardous substance to the site. If these parties are able and willing to undertake the response task, the USEPA either negotiates a legal agreement with them or unilaterally orders them to do so. Should they be unable due to bankruptcy, or refuse to comply with the order altogether, the USEPA can undertake the response actions itself.

What is SARA?

The Superfund Amendments and Reauthorization Act (SARA), passed in 1986, was the first major revision of CERCLA since its inception. One year prior, the National Contingency Plan had been created to establish a blueprint for cleanup activities in response to released to the water, land, or air. The SARA expanded the 1985 National Contingency Plan to include the provision that remedial actions must at least attain applicable or relevant and appropriate requirements (ARARs).

ARARs determine the technical standards for cleanup activities at a CERCLA site. The applicable requirements are federal or state environmental or public health laws and regulations or cleanup standards specific to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. If a requirement is not directly applicable, it may still be relevant and appropriate. Those requirements may address problems or situations sufficiently similar to those encountered at the CERCLA site that their use may be well-suited to the particular site. A relevant requirement, however, may or may not be considered appropriate.

Another important element contained is SARA gave the states a greater role than they enjoyed under the previous version. The states' roles are now to join the USEPA in all stages of identifying National Priority List sites and the appropriate cleanup remedy.

What is Community Right-to-Know?

Contained in the 1986 SARA was the Emergency Planning and Community Right-to-Know Act. The Right-to-Know Act creates emergency planning, reporting, and notification requirements intended to protect the public in the event of a release of a hazardous substance. Facilities are required to report the presence of hazardous chemical substances in addition to those listed as extremely hazardous.

Emergency release notice is only required by the act if the release is of an USEPA-listed substance extending beyond the facility's boundaries. The Right-to-Know Act also includes a system of administrative, civil, and criminal penalties to enforce notification requirements. USEPA may order governments and commercial facilities into compliance. In addition, both USEPA and private citizens may bring a civil action against them and request that a court impose monetary penalties for violations or the USEPA may seek criminal sanctions.

How do I get more information?

To learn more about CERCLA and other aspects of the Formerly Utilized Sites Remedial Action Program, please contact the U.S. Army Corps of Engineers FUSRAP Public Information Center at (716) 871-966. Or you may call the FUSRAP 24-hour, toll-free public access line at (800) 253-9759.

FUSRAP also has a home page on the Internet at ***http://www.fusrap.doe.gov***

Or visit the Information Center at:

U. S. Army Corps of Engineers
FUSRAP Public Information Center
70 Pearce Avenue
Tonawanda, NY 14150

FUSRAP NFS Community Meeting
Monday, January 12, 1998

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Name	Representing	Phone	Street Address	State	Zip Code	Would you like to be added to our mailing list? Y/N
Bob Gallucci		[redacted]				
John Mitchell	NYSDEC	[redacted]				
Judy Leithner	USACE	[redacted]				
Tom Leithner	SELF	[redacted]				
DAN McGUIRE	SUDHAKAR	[redacted]				
R Nils Olsen, Jr.	ROLE	[redacted]				
Pat Griffin	Bechtel	[redacted]				
Frank Parsons	USAE	[redacted]				
Barbara Ignatz	NYSDOH	[redacted]				
Ann McBride	NIAGGA	[redacted]				
Timothy Henderson	R.O.	[redacted]				
Mary Brennan Taylor		[redacted]				
RICK PROHASKA	OHM Re	[redacted]				
ANN BURKE	OHM R	[redacted]				
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Gina Kitcho						
Ron Poland						
Diane Poland						
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