F U S R A P U P D A T E

The St. Louis Sites

Formerly Utilized Sites Remedial Action Program • Winter 2014

(314) 260-3905 www.mvs.usace.army.mil

St. Louis Formerly Utilized Sites Remedial Action Program Activities

In Fiscal Year 2013 (FY13), 28,500 cubic yards (cys) of contaminated material were shipped from the St. Louis Formerly Utilized Sites Remedial Action Program (FUSRAP) sites to an out-of-state, licensed and permitted disposal facility.

St. Louis Downtown Sites

At the St. Louis Downtown Sites (SLDS), remediation continues underneath the footprint of former Building 101. Four properties were released at the SLDS in FY13.

Inaccessible Soil Operable Unit Proposed Plan

The U.S. Army Corps of Engineers (USACE) is currently developing a Proposed Plan (PP) recommending no further action for selected properties associated with the Inaccessible Soil Operable Unit at the SLDS. The properties included in this PP are those that require no further action for the protection of human health and the environment. The public will have an opportunity to review and comment on the PP this winter. The PP and other supporting documents will be available on the St. Louis District FUSRAP website and in the Administrative Record File locations during the public review period. A public meeting will occur this winter to present the proposed remedy, as well as to accept public comments regarding the PP.

Latty Avenue Sites

During FY13, the USACE completed remedial activities at the Latty Avenue sites with the clean-up of the Futura and Vicinity Property (VP)-01(L) Buildings. Documentation to release VP-02(L) and the Hazelwood Interim Storage Site were issued. In FY14, the USACE will issue documentation to release the VP-01(L) Buildings and the Futura property. Institutional controls for the soils under the Futura Buildings will be implemented.

Building 101 Remediation – St. Louis Downtown Site

St. Louis Airport Site Vicinity Properties

During FY13, the USACE completed remedial activities at the Ballfields Phase 2. Remedial activities were also completed at two other VPs. Sampling in Coldwater Creek (CWC) was completed from the McDonnell Boulevard Bridge to Frost Avenue. Sampling in CWC from Frost Avenue to the St. Denis Bridge was initiated and is anticipated to be completed by late next Fall (2014). Eleven North County properties were released in FY13.

Five Year Review

The USACE will conduct the third Five Year Review (FYR) in 2014. Under the Comprehensive Environmental Response, Compensation, and Liability Act, an evaluation of response actions at hazardous waste sites where contaminants remain on site above the remediation goals is required at least every five years following the start of cleanup activities at the site. The FYR determines whether the cleanup response continues to be protective of human health and the environment. These reviews begin five years after the initiation of the first response and continue in five year cycles to perpetuity or at least until the contamination is removed from the site.

Upcoming Events

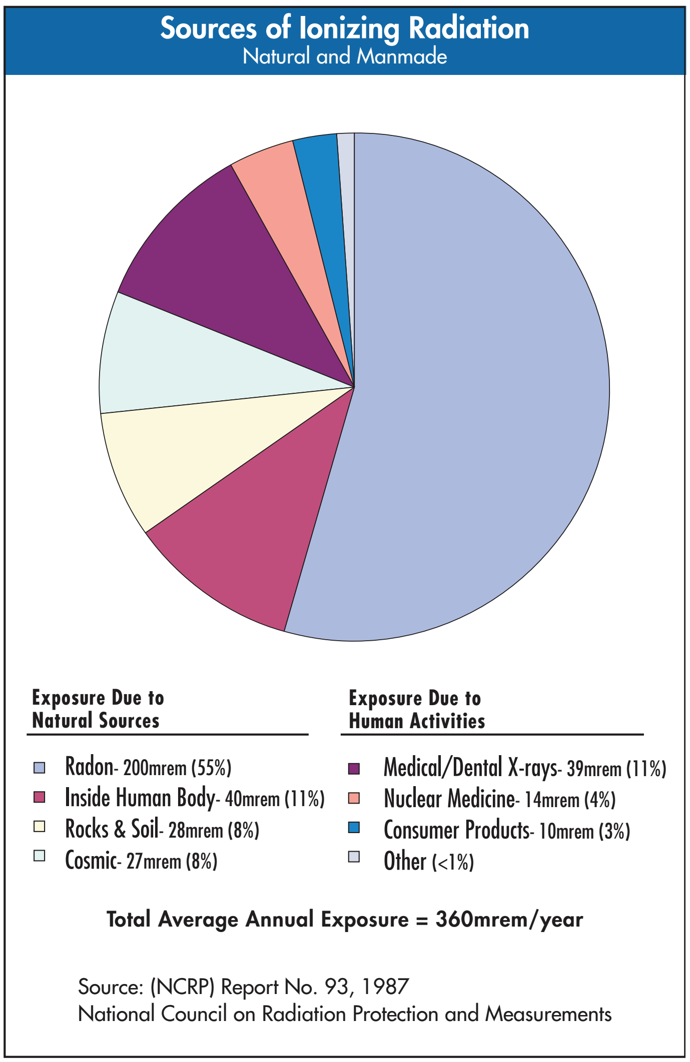
Information Releases: Summer Newsletter - August 2013
This newsletter is issued twice a year.

Upcoming Meeting: St. Louis Oversight Committee Meeting - 6:00 pm, January 14, 2014 at the Hazelwood Civic Center East. Check www.mvs.usace.army.mil/eng-con/expertise/fusrap.html for updates, or call Jo Anne Wade at 314.260.3913.

Radiation Basics

At its simplest, radiation is energy moving through something. Heat traveling through your coffee mug to warm your hand and light from the sun traveling through space are just a couple of examples of radiation.

A more scientific definition of radiation is a type of energy given off by atoms with unstable nuclei that travels in waves or particles and may be able to penetrate various materials. The *Electromagnetic Spectrum* (or EM Spectrum) arranges the forms of radiation from lowest energy to highest energy.



Light, radio waves and microwaves are examples of radiation that appear on the low end of the EM Spectrum. These low energy types of radiation are called *non-ionizing radiation* because they do not have enough energy to acquire a negative or positive charge by gaining or losing electrons.

Higher energy radiation is called *ionizing radiation* because atoms with unstable nuclei carry enough energy to emit energy or mass in order to reach stability. The types of ionizing radiation a person typically encounters are alpha, beta or gamma/x-ray.

Alpha particles are an emission of two protons and two neutrons. These particles travel very short distances (1-3 inches) in the air and can be blocked by a sheet of paper. Alpha particles are too large to penetrate your skin.

Beta particles are an emission of stray electrons. They can travel 6-10 feet but can be blocked by plastic, aluminum, your clothing etc.

Gamma rays are produced by the decay of atomic nuclei from high energy states but are also created by other processes. They can travel the farthest but can be stopped with higher density materials such as lead or concrete.

Radiation is measured by the dose – defined as the quantity of absorbed energy. The *rem* is the unit used for equating radiation absorption within human tissue. The mrem (millirem, or one thousandth of a rem) is often used for the dosages commonly encountered.

Background radiation can be found everywhere in our environment in trace amounts. We encounter radiation in naturally occurring radioactive isotopes from terrestrial sources such as rock, vegetation, water, soil and people and also from cosmic sources such as the sun.

Each year an individual receives an average radiation dose of approximately 300 mrem from background radiation. The average American receives an additional 60 mrem per year from human activities such as x-rays and other medical devices.

How does FUSRAP compare to of Chernobyl?

Often when people think of radioactive contamination they think of the Chernobyl nuclear reactor explosion that occurred in 1986. While both FUSRAP and Chernobyl involve unintentional release of radioactive contamination into the environment, there is a vast difference. A comparison appears in the following table.

FUSRAP	Chernobyl
FUSRAP is a program that identifies and remediates radioactive residues as a result of uranium processing during the nation's early atomic program in the 1940's and 50's.	Chernobyl was a nuclear reactor that suffered a full meltdown in the 1980's sending radioactive particles and gases into the atmosphere.
North County and the SLDS FUSRAP wastes contain low-level radioactive residues from the uranium conversion process.	High-level radioactive fission products from the nuclear reactor were released into the atmosphere because of the Chernobyl explosion.
FUSRAP wastes contain naturally occurring radium, thorium and uranium that primarily emit alpha particles.	Fission products from the nuclear reactor explosion primarily emit beta and gamma radiation (iodine-131, cesium-137 and strontium-90).
FUSRAP waste is mostly found within shallow land areas (soils), migration areas and sediment.	Chernobyl radioactive products are found on the surface of vegetation, soils, buildings, and surface water.

Coldwater Creek

In 2012, the USACE initiated sampling in Coldwater Creek (CWC) from the McDonnell Boulevard Bridge to Frost Avenue. Over one thousand samples have been collected to characterize this segment of the creek. The results of this effort indicate contamination exceeds FUSRAP remedial goals at McDonnell Bridge and two other isolated locations of deposition along the creek bank. Sampling was initiated at the second segment of CWC from Frost Avenue to the St. Denis Bridge in October 2013. The USACE anticipates that this sampling effort will be completed by late 2014.

Why does it take so long to sample a segment of the creek?

There are several steps involved to initiate and complete sampling in the creek. Before sampling can begin, a sampling plan is prepared to summarize the existing data, define additional data needs, describe the rationale and methods for conducting the sampling and identify the proposed sample locations. This multi-prong approach ensures that all potentially contaminated areas in the creek and banks are investigated.

In order to physically access the creek, the rights-of-entry (ROEs) must be obtained from property owners adjacent to the creek. Once the sampling crews are allowed access, a path must be cleared through the heavy vegetation on the creek banks. The sampling crews may encounter obstacles such as tree roots, debris, and rocks that prevent sampling in the appointed areas. When this occurs, the sampling locations are changed to locations that are as close as possible to the original location. The steepness of the creek banks and water in the creek also pose obstacles that make sampling difficult. In addition, the weather, such as heavy rain or flash floods prevents the sampling crews from safely entering the creek channel, thus causing delays. Finally, USACE collects a large number of samples from within the creek corridor which takes time. Collecting numerous samples assures that adequate sample coverage of the area has been achieved.

Once the samples have been collected, they are sent to the laboratory for analysis. To obtain accurate measurements of the samples, the sample must be dried. In some cases, based on the moisture content of the sample, it takes several days to prepare and dry the creek samples for analysis. In addition to the creek samples, the laboratory analyzes samples collected from other St. Louis FUSRAP sites. As a result, sample schedules occasionally require adjustment based on the overall project priority. Sample results are quality checked and validated to ensure the data are accurate and precise.

If the analytical results of the sample indicate that contamination is present above the remediation goals, then another round of sampling may be required in the vicinity of the elevated sample to further investigate the area. These additional samples are used to bound or delineate the area of contamination around the original sample. This information assists in determining the size of the area impacted and the depth of the contamination. The process of preparation, analysis and validation of data must be performed again for any additional samples collected. Once all the data is analyzed and validated, a data table is prepared that contains all the results, depths, and identification of each sample. At the conclusion of sampling and analysis, a report is written to discuss the results of the sampling and to describe any deviations, such as sample location or schedule delays, from the original sampling plan and the rationale for that deviation.

Keeping in Touch

Mailing Lists - To receive newsletters and other printed communications, sign up for our mailing list any time.

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Homepage - To reach our site, go to www.mvs.usace.army.mil/eng-con/expertise/fusrap.html

If you have any suggestions, questions, or comments, please contact us.

Educational Information

Q: How Does the USACE Determine if Contamination Exceeds Remedial Goals?

A: When more than one radiological contaminant is present on a site, the combined effects of the contaminants are evaluated through the use of the sum of the ratios (SOR) calculation. The SOR, also known as the "unity rule", is the sum of each individual contaminant concentration, corrected for background, and divided by its applicable remedial goal (RG). The total sum of the ratios of concentrations to their RG is limited to one (i.e., unity) when averaged over a 100 square meter (m^2) area. Remedial goals for the FUSRAP contaminants are presented in the Records of Decision (ROD).

To concurrently address each of the radionuclides of interest, a SOR calculation is applied as follows for Ra-226, Th-230 and U-238 using the North County remedial goals as an example:

$$\text{Ra-226} \;-\; SOR_{surface} = \frac{^{226}Ra_N}{5\,pCi/g} + \frac{^{230}Th_N}{14\,pCi/g} + \frac{^{238}U_N}{50\,pCi/g} \leq 1$$

$$\text{Th-230} \;-\; SOR_{subsurface} = \frac{^{226}Ra_N}{15\,pCi/g} + \frac{^{230}Th_N}{15\,pCi/g} + \frac{^{238}U_N}{50\,pCi/g} \leq 1$$

$$\text{U-238} \;-\; SOR_{sediment} = \frac{^{226}Ra_N}{15\,pCi/g} + \frac{^{230}Th_N}{43\,pCi/g} + \frac{^{238}U_N}{150\,pCi/g} \leq 1$$

When the soil/sediment sampling average SOR is less than 1.0 over a 100 m2 area, remediation is not required. If the soil/sediment average SOR is greater than 1.0 over a 100 m2 area, then ROD RGs are exceeded and remediation is required.

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