Formerly Utilized Sites Remedial
Action Program (FUSRAP)

# Maywood Chemical Company Superfund Site

# ADMINISTRATIVE RECORD

## Document Number

## MISS- 047.

US Army Corps
of Engineers®

# THE U.S. DEPARTMENT OF ENERGY WILL HOLD AN AVAILABILITY SESSION for the MAYWOOD, NEW JERSEY, SITE

**Tuesday, June 8, 1993**
**6:00 p.m. – 9:00 p.m.**

**at the**
**DOE Public Information Center**
**43 West Pleasant Avenue**
**Maywood, New Jersey**

Representatives of DOE are holding an informal public information session to answer any questions you might have about the Maywood Site.

DOE has responsibility for the cleanup of radioactively contaminated properties in Maywood, Rochelle Park, and Lodi under its Formerly Utilized Sites Remedial Action Program (FUSRAP). For directions or for more information, please call the DOE Public Information Center, (201) 843-7466.

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# FUSRAP
## Baseline Risk Assessment at the Maywood, New Jersey, Site

May 1993

U.S. DEPARTMENT OF ENERGY
Formerly Utilized Sites Remedial Action Program

*This fact sheet has been prepared to address community outreach requirements set by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Environmental Policy Act (NEPA). Fact sheets are one part of an effort to provide public information on environmental restoration and waste management.*

The U.S. Department of Energy (DOE) has completed a baseline risk assessment (BRA) for the Maywood site in Bergen County, New Jersey. The Maywood site, which is on the Environmental Protection Agency (EPA) National Priorities List (Superfund) for cleanup, is located in a commercial and residential area in northeastern New Jersey. The BRA is required as part of the Superfund site cleanup process. Its purpose is to evaluate the potential threat to human health and the environment if the site is not cleaned up. The results of the BRA provide a basis for determining the need for site cleanup.

Responsibility for cleanup of the Maywood site was assigned to DOE by Congress in 1984. Contamination at the site is a result of commercial thorium processing operations conducted by the former Maywood Chemical Works between 1916 and 1959. Over 80 properties in the vicinity of the former Maywood Chemical Works facility were contaminated with radioactive materials from the facility. Twenty-five of these properties have already been cleaned up by DOE, and the contaminated material generated from these activities is currently stored at the DOE-owned Maywood Interim Storage Site (MISS).

### METHODS

The BRA identifies the means by which people and the environment may be exposed to contaminants that are present at the Maywood site. Mathematical models are used to predict the possible effects on human health and the environment from exposure to radionuclides and chemicals in both present and possible future uses at the site. Future use of a property may be different from its current use. An example would be commercial property becoming residential property sometime in the future.

Because of previous thorium processing activities at the site, it was expected that radioactive materials would be the primary contaminant present. However, both radioactive and chemical contaminants were evaluated. From data presented in the remedial investigation report, estimates of average and maximum exposures were calculated. (For more information on the remedial investigation at Maywood, see the fact sheet, "Remedial Investigation at the Maywood, New Jersey, Site.")

Mathematical models are used to predict risks

## RESULTS

The remedial investigation identified three primary radionuclides; thorium-232, with lesser amounts of uranium-238 and radium-226. Chemicals identified above background (naturally occurring) concentrations included metals primarily associated with former processing activities, such as arsenic, copper, lead, and nickel. Organic compounds were also detected in former processing areas and included toluene, an organic solvent. (No organics were used in thorium processing. They may be the result of natural decay or the industrialized nature of the area.) These radioactive and chemical contaminants were found at various concentrations in the soil, groundwater, surface water, and sediments.

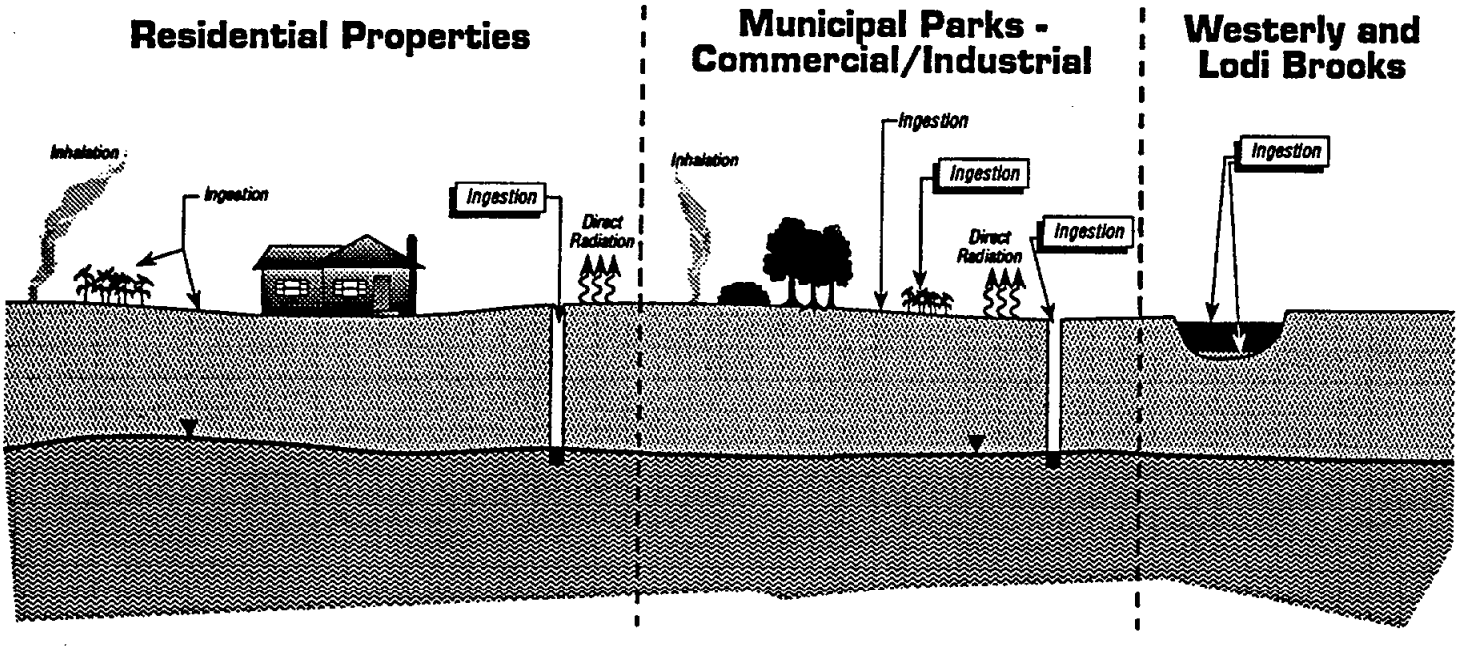
This information was then mathematically modeled to predict the potential health risks for people living, working, or visiting the areas where radionuclides and chemicals were found. In accordance with EPA guidance, the primary health risks investigated were cancer and other chemical-related illnesses.

The modeled risk estimates were then compared to an EPA-established "target risk range" for cancer. This range estimates the chance that an individual would develop cancer over a 70-year lifetime as a result of being exposed to contamination. The range is 1 chance in 10,000 to 1 chance in 1,000,000 ($10^{-4}$ to $10^{-6}$). To keep these numbers in perspective, according to EPA, 100 out of every 10,000 people in this area will develop cancer due to naturally occurring background radiation. EPA's upper limit of the risk range adds one more person in 10,000 to this group.

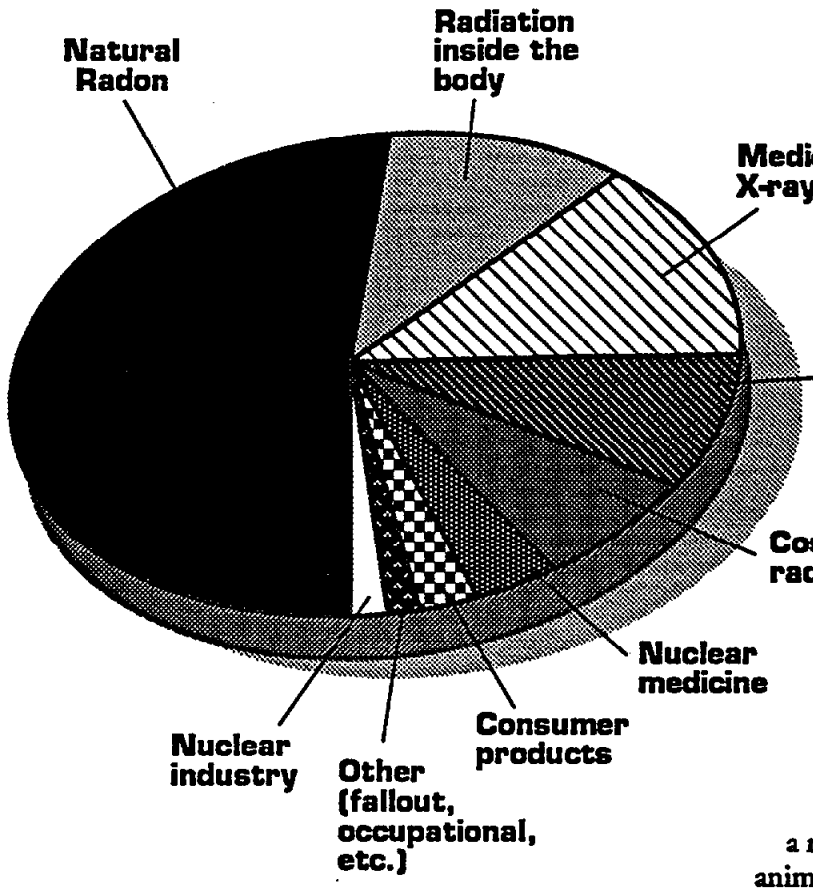
## RADIOLOGICAL RISK

The BRA presents results for average exposure conditions under current and predicted future land use for the contaminated properties. These results are calculated using the average radionuclide concentrations. The results predicted that for current land uses, only employees located at certain areas on MISS would be considered at risk. These results assume that employees are located at areas of contamination seven hours each day, 250 days per year, for seven years. No one is currently at these locations for this duration. For estimated future land uses, radiological risk was outside the EPA range of acceptability for these same locations on MISS and a portion of two commercial properties near MISS.

EPA requires that the modeling also include what is called a reasonable maximum exposure (RME) scenario. These calculations assume that an individual would be exposed to the maximum possible concentration of contaminants for most of their day. For current land uses, the model predicted that exposure would fall outside the EPA range of acceptability for employees at certain areas




Potential exposure routes at the MISS site




Natural sources of radiation

of MISS and two commercial/industrial properties near MISS; some of the residents along a road at the I-80 eastbound right-of-way; and visitors to a location on MISS where thorium processing occurred. The RME exposure for future land uses estimates all properties except a few residences would exceed the target risk range.

## CHEMICAL HEALTH RISK

The risk of developing cancer over a 70-year lifetime from chemicals that have been shown to cause cancer was evaluated for both average exposure and for a reasonable maximum exposure. None of the estimated cancer risks exceeded the EPA risk range of acceptability for current land uses. The only risk predicted for future land uses was drinking the groundwater directly beneath MISS for both the average and reasonable maximum conditions. This risk is reduced as the water flows away from MISS and is within EPA's range of acceptability 500 feet from MISS. In addition, no effects would be expected for non-cancer chemical illnesses under current land uses.

For the predicted future scenario there is a small chance of potential effects associated with drinking the groundwater located directly beneath MISS. Again, this risk falls into the acceptable range less than 500 feet from MISS. It should be noted that no one is using this groundwater as a drinking water source, and although MISS is currently a secure area with limited access, all the future risk estimates assume that these controls are no longer in place.

## ECOLOGICAL RISK

Thorium, uranium, radium and several heavy metal levels found in the surface soils are suspected to pose a risk to the site ecology (plant and animal life). However, no threatened or endangered species of plants or animals are known to inhabit the site.

## UNCERTAINTIES

There are many uncertainties associated with the process of estimating risks. As an example, many assumptions are made concerning conditions that do not actually exist (such as drinking contaminated groundwater that no one is actually drinking). Most of the calculations are based on conservative assumptions that will tend to overestimate the degree of actual risk.

## THE NEXT STEP

The information from the BRA will be used to assist in the development of cleanup alternatives in the feasibility study (FS). The BRA and RI reports are now available for public review in the Administrative Record file located at the DOE Public Information Center, 43 West Pleasant Avenue, and the Maywood Public Library, 459 Maywood Avenue. Public comments will be requested on these documents, along with the FS, in the summer of 1993.

For more information, please visit or call:

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# FUSRAP
## Remedial Investigation at the Maywood, New Jersey, Site

May 1993

U.S. DEPARTMENT OF ENERGY
Formerly Utilized Sites Remedial Action Program

*This fact sheet has been prepared to address community outreach requirements set by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Environmental Policy Act (NEPA). Fact sheets are one part of an effort to provide public information on environmental restoration and waste management.*

The U.S. Department of Energy (DOE) has completed a remedial investigation (RI) for the Maywood site in Bergen County, New Jersey. The Maywood site, which is on the Environmental Protection Agency (EPA) National Priorities List (Superfund) for cleanup, is located in northeastern New Jersey. The purpose of the RI is to define the type and extent of contamination, under DOE's responsibility, that is present at the site.

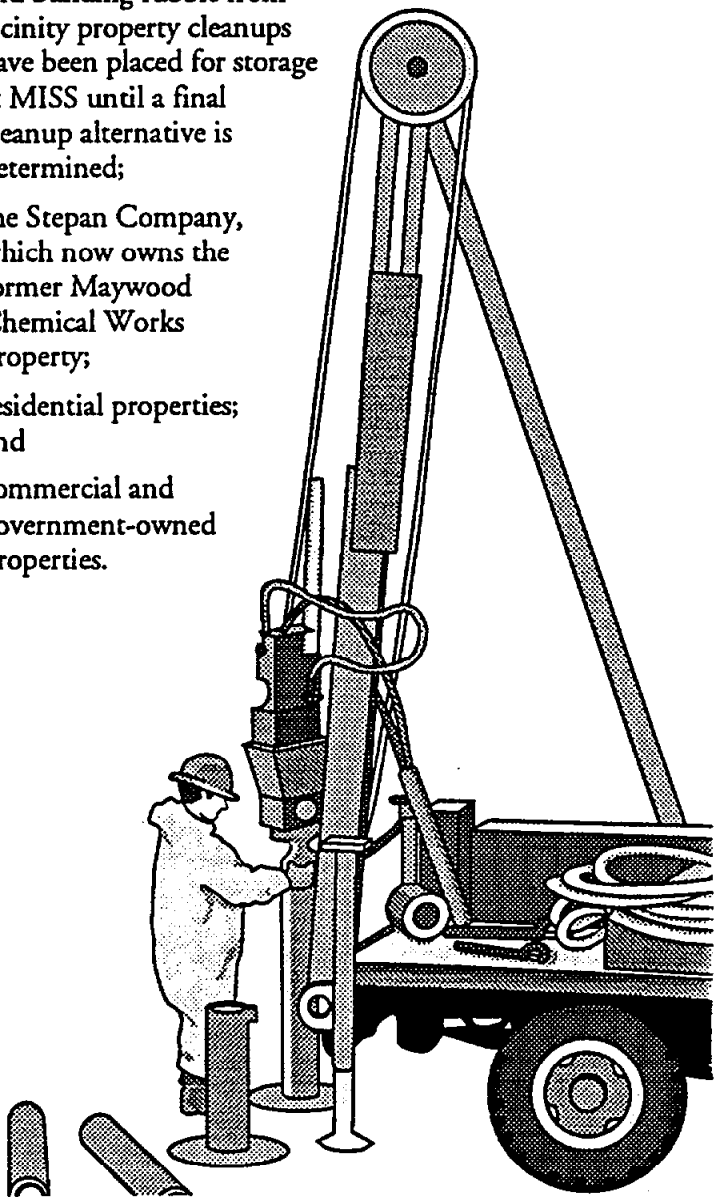
Responsibility for cleanup of the Maywood site was assigned to DOE by Congress in 1984. Contamination at the site is a result of commercial thorium processing operations conducted by the former Maywood Chemical Works between 1916 and 1959. Over 80 properties in the vicinity of the former Maywood Chemical Works facility were contaminated with radioactive materials from past disposal practices. Twenty-five of these properties have already been cleaned up by DOE, and the contaminated material generated from these activities is currently stored at the DOE-owned Maywood Interim Storage Site (MISS).

The RI is the final study in a number of other efforts to identify both chemical and radiological contaminants at the Maywood site. The Stepan Company is also studying the site under orders from EPA. Responsibility for cleanup of the site is divided between DOE and Stepan.

### HOW THE RI WAS CONDUCTED

The Maywood site includes 85 properties in Maywood, Rochelle Park, and Lodi. For study purposes, the site was divided into four study areas:

- the DOE-owned Maywood Interim Storage Site (MISS) was the location of past thorium processing activities. Low-level radioactive soil and building rubble from vicinity property cleanups have been placed for storage at MISS until a final cleanup alternative is determined;
- the Stepan Company, which now owns the former Maywood Chemical Works property;
- residential properties; and
- commercial and government-owned properties.



A sampling plan was developed that identified the methods for collecting the samples for each of these study areas and the analyses to be performed. (The field sampling plan, which describes the sampling methods used, is available for public review.) Samples were collected in accordance with standard procedures set by EPA and the New Jersey Department of Environmental Protection and Energy (NJDEPE). Samples were collected and analyzed of surface and subsurface soils, surface water, sediments, and groundwater.

Two types of surveys were performed to identify where soil samples should be collected and analyzed. The first type of survey used a gamma radiation detector, while the second used the same type of equipment with a lead-lined shield. The purpose of the shield is to ensure that the instrument detects gamma radiation directly beneath it and is not influenced by radiation from nearby sources.

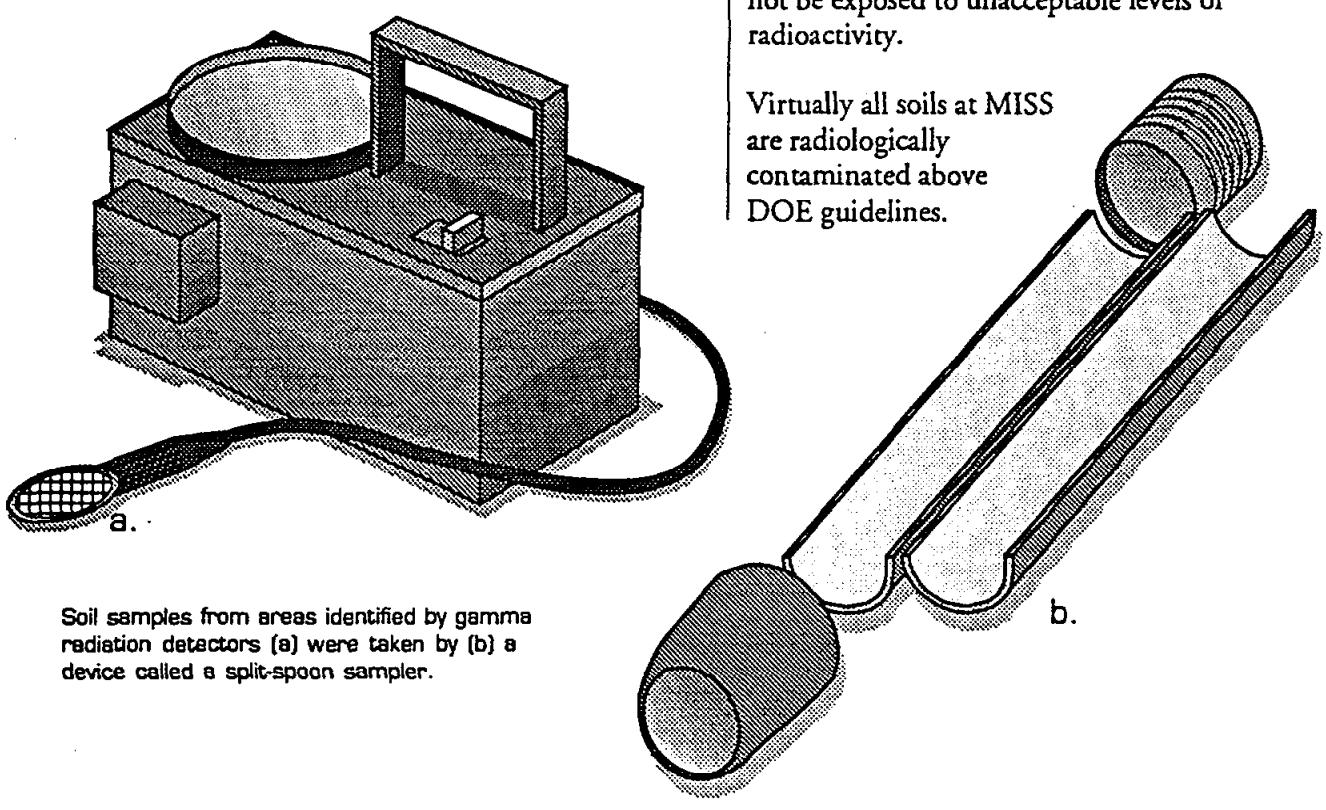
These surveys were performed to identify areas where radiation levels were two times higher than background. Both surface (top six inches) and subsurface soil samples were collected from these locations. Subsurface soils were collected using split-spoon sampling devices (see illustration). A split-spoon sampler is a steel tube that is driven into the soil to collect samples. Surface water and sediment samples were collected from Lodi and Westerly Brooks. Groundwater samples were collected from monitoring wells.

## RADIOLOGICAL SAMPLING RESULTS

The primary radioactive contaminant at the site is thorium-232. Uranium-238 and radium-226 are also found, but typically at lower concentrations. Results of radiological analyses are usually expressed in terms of the concentration of radioactivity in a given amount of air, water, or sediment. The concentration is expressed in terms of picocuries (pCi) of radioactivity per liter (of air or water) or gram (of soil or sediment). A pCi is one-trillionth of a curie.

As was expected, concentrations of radioactive material from samples taken from MISS and the burial pits at the Stepan property were above DOE cleanup guidelines. These guidelines – 5 pCi per gram for thorium and radium in surface soils and 15 pCi per gram in subsurface soils – are low enough to ensure protection of human health and the environment. After an area is cleaned up to these levels, a person could live in a house built upon previously contaminated property, grow food, raise and consume livestock on the property, and drink water from an onsite well, and still not be exposed to unacceptable levels of radioactivity.

Virtually all soils at MISS are radiologically contaminated above DOE guidelines.




Soil samples from areas identified by gamma radiation detectors (a) were taken by (b) a device called a split-spoon sampler.

Concentrations of thorium-232 detected in the storage pile averaged about 20 pCi per gram. Levels of associated uranium-238 and radium-226 measured 17 and 2.4 pCi per gram, respectively. These results are expected because the material in the pile came from previous cleanup activities.

Radioactive contamination on the Stepan property is present in both surface and subsurface soils. In the burial pits on the Stepan property, thorium concentrations were considerably higher than on other parts of the property. Maximum concentrations were approximately 1600 pCi per gram. However, more typical concentrations in the pits ranged between 1.3 and 50 pCi per gram. The contaminated areas are covered with either grass or asphalt, thereby reducing the levels of radiation exposure to the public. Several buildings on the Stepan property are radiologically contaminated. The contamination is fixed in place and therefore is not easily transferable.

Radiological contamination was found on residential properties mostly along the former channel of Lodi Brook, in areas where contaminated sediment was deposited outside the creek banks. Other residential properties were contaminated where material from former activities was used as fill or mulch. Surface soil concentrations of thorium-232 ranged from less than 0.5 to 111.6 pCi per gram. Subsurface soil concentrations for thorium-232 ranged from less than 0.3 to 72.5 pCi per gram. Ranges for uranium-238 and radium-226 concentrations were significantly lower than thorium-232 in both surface and subsurface soils.

Radioactive contamination was found on the commercial and government-owned properties also along the Lodi Brook channel. Thorium-232 concentrations ranged from 0.3 to 48 pCi per gram. Again, concentrations for uranium-238 and radium-226 were lower than thorium-232.

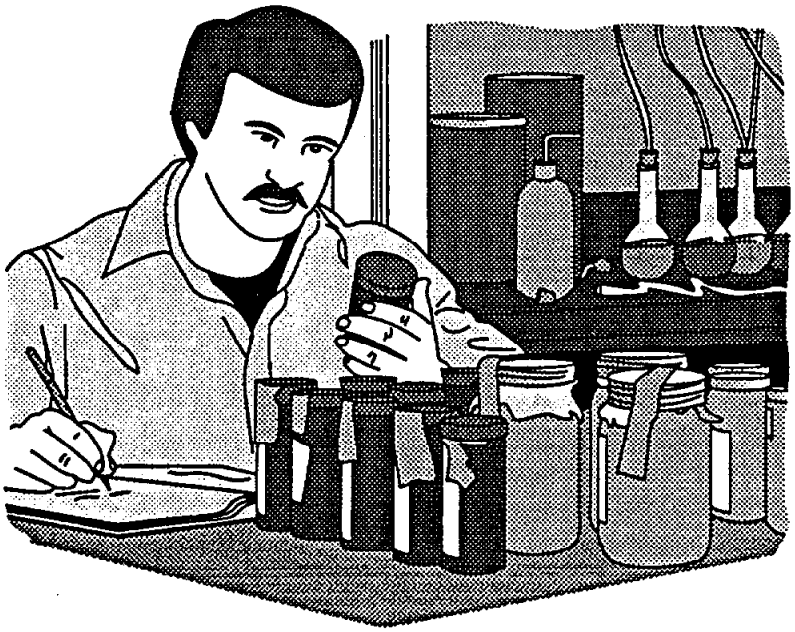
As previously noted, at all of the areas studied in the RI, soil contamination is kept in place by grass, asphalt, concrete, or building foundations. The contamination therefore cannot leave these areas by means of surface transport.

Surface water, sediment, and groundwater samples collected over a period of several years indicate that radioactive contamination is not leaving MISS.

## CHEMICAL INVESTIGATIONS

Chemical contamination that is DOE's responsibility to address is defined in an agreement between DOE and EPA. This includes chemicals known to be associated with the thorium extraction process, chemicals that are mixed with radioactive contaminants, and all chemical contaminants on or migrating from the DOE-owned MISS.

Based on DOE's responsibilities, chemicals identified as primary contaminants were metals and rare earth elements including, but not limited to: arsenic, cobalt, copper, lead, nickel, selenium, vanadium, cerium, lanthanum, and neodymium. A wide range of other chemical contaminants was also analyzed for each of the samples taken. Concentrations of chemicals are expressed as parts per million or parts per billion. (Parts per million can be thought of as 1 part orange juice to 1,000,000 parts water.) No hazardous wastes were found on any of the areas studied.



All samples underwent rigorous laboratory analysis to determine radiation and chemical concentrations.

Rare earths on the Stepan property ranged in concentrations from 46 to 6620 parts per million, most of which were in areas that were also radioactively contaminated. Metals detected in the radioactively contaminated areas ranged from 0.4 to 728 parts per million. These metals included lithium, which had the highest concentrations; antimony, barium, boron, cadmium, and thallium were also detected.

At MISS, the waste pile itself revealed the primary chemical contaminants as well as detectable traces, in the parts per billion range, of toluene and polyaromatic hydrocarbons. These are probably residues from waste retention ponds that were used during former processing activities. On the remainder of MISS, metal contaminants were present in ranges of 0.5 to 1060 parts per million. Besides the primary contaminants, other metals such as chromium and lithium were present in maximum concentrations of 1510 and 2290 parts per million, respectively. Primary rare earth contaminants were typically detected in radioactively contaminated areas, ranging from 40 to 3140 parts per million. Organics on the site were detected infrequently.

Since no organics were used in the thorium processing, they were not considered primary contaminants. However, trace levels of organics were identified, both in radioactively and non-radioactively contaminated areas. These organics were likely the result of natural vegetative decay and of the industrialized nature of the area.

On both the residential and commercial/ government properties, primary contaminants were detected in the 0.3 to 1150 parts per million range in radioactively contaminated areas.

Chemical sampling and analysis of surface water in the study areas revealed concentrations below drinking water standards. Lithium has been detected downstream from MISS; however, there is no regulatory guideline for this metal.

Analysis of groundwater samples detected low concentrations of metals and some organics. Additional sampling of groundwater is planned.

## THE NEXT STEP

Since 1986, DOE has routinely monitored surface water, sediment, groundwater, and air at MISS. Results of the monitoring program are reported annually in a Site Environmental Report that is available to the public.

Information compiled during the RI is being used to develop a baseline risk assessment (BRA) in order to evaluate the risks to human health and the environment if no cleanup action is taken. This information will also be used in another study to develop and evaluate alternatives for addressing the contamination at the site. That report, along with the RI and BRA, is scheduled for completion the summer of 1993. Once available, public comments will be requested on all three documents.

For more information, please visit or call:

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