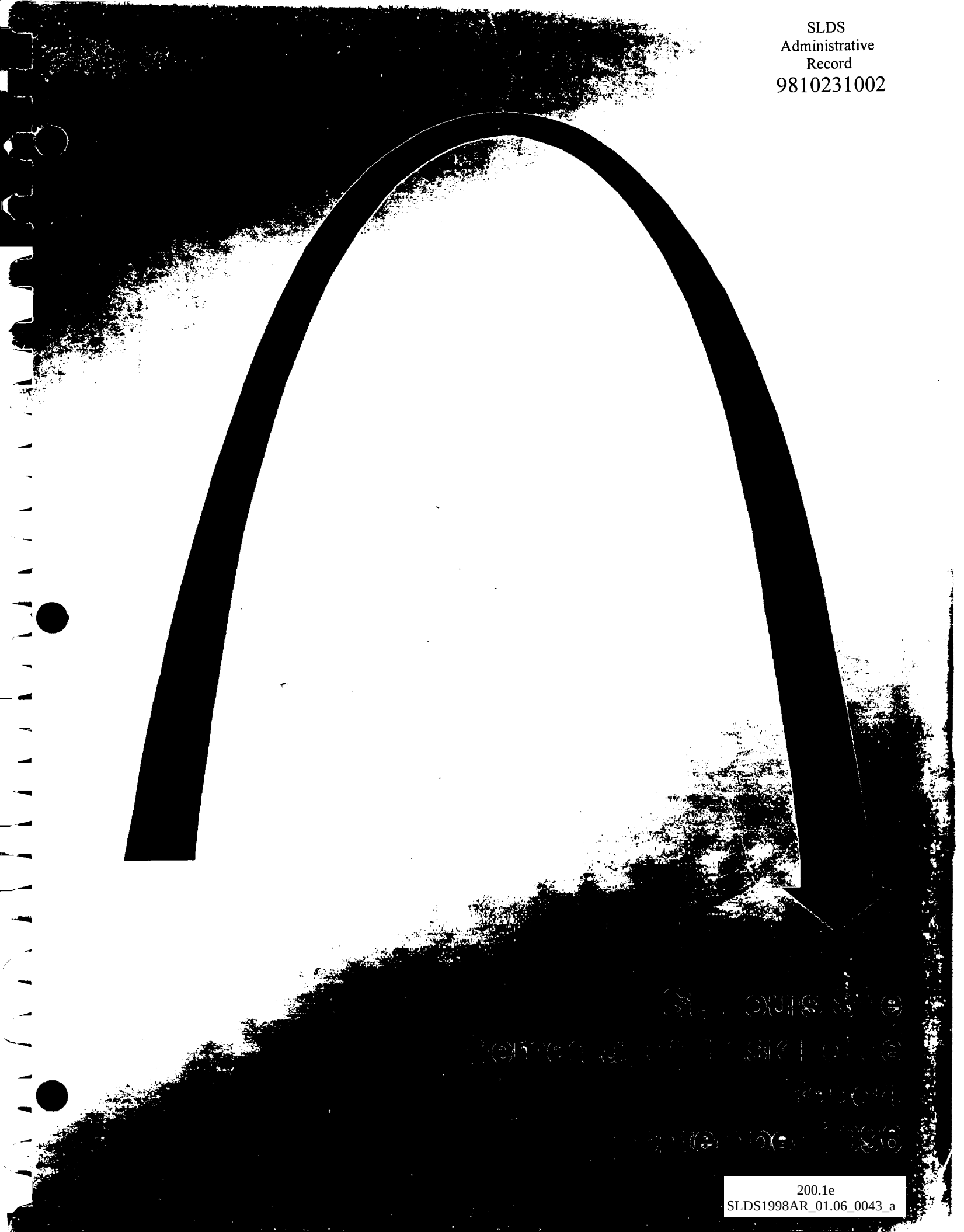

Mission Statement

The St. Louis Site Remediation Task Force is a broadly based representative body formed in September 1994 to identify and evaluate remedial action alternatives for the cleanup and disposal of radioactive waste materials at the St. Louis FUSRAP Site and at West Lake Landfill, and to petition the U.S. Department of Energy to pursue a cleanup strategy that is environmentally acceptable and responsive to public health and safety concerns.

Sally P. Price
Chair

Anna Ginsburg
Vice Chair

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EXECUTIVE SUMMARY

For over 50 years, a long-term environmental, health and safety issue has existed in the St. Louis community due to radioactive contamination created by the development of the world's first atomic bomb. As World War II began to escalate a sense of need and urgency motivated the U.S. government to find the expertise to develop a process for extracting and purifying uranium for nuclear weapons production. Mallinckrodt Chemical Works located in downtown St. Louis had the experience base to undertake the challenge. This national defense project known as *The Manhattan Project* and ongoing nuclear weapons production, left St. Louis with a legacy of environmental, health and safety problems.

From concept through the early years of the Cold War, St. Louis was the only source of processed uranium in the entire country. The aftermath of The Manhattan Project has left St. Louis with the largest Site in the Department of Energy's (DOE) Formerly Utilized Sites Remedial Action Program (FUSRAP) in both acreage and volume of radioactive waste material. The complexity of remediating the Site is magnified by a unique set of factors existing in St. Louis:

- Contaminated sites are located in a densely populated metropolitan area of 2.4 million people
- Industrial, residential, and recreational activities have occurred and continue to occur in and around the contaminated sites
- Evidence indicates that extensive migration of radioactive contaminants by air, surface water and ground water transport has occurred and current evaluations suggest ongoing migration
- Contaminated properties, primarily single family residential and commercial developments, are in an urban flood plain
- Coldwater Creek, within a 47-square-mile urban watershed, contains radioactive sediment
- The Post Maquoketa aquifer, which lies beneath the St. Louis Airport Site (SLAPS) and extends north through St. Louis County and under many of the radiologically-contaminated properties, is the only bedrock aquifer yielding potable water in northern St. Louis County
- NO community acceptance exists for a permanent repository at SLAPS or in St. Louis

In 1990, voters in St. Louis City and County voted NO on a referendum to establish a permanent radioactive waste bunker at the St. Louis Airport Site (SLAPS) or any at other property in the St. Louis area. In response to the public's outrage over the permanent repository plan proposed by the Department of Energy (DOE) for the St. Louis FUSRAP site, Thomas Grumbly, then DOE Assistant Secretary for Environmental Management, came to St. Louis to meet with St. Louis Mayor Freeman Bosley Jr., the Mayor's Advisory Task Force on Radioactive Waste, St. Louis County Executive Buzz Westfall, and the St. Louis County Radioactive & Hazardous Waste Oversight Commission. He proposed the creation of a Task Force made up of the city and county commissions and other community stakeholders.

Grumbly asked the Task Force to develop a community-based vision concerning remediation of the radioactively contaminated sites in St. Louis City and County as an alternative to the permanent repository strategy. The challenge for the community was to devise an environmentally sound, financially responsible and implementable approach that best met the needs of St. Louis and its citizens.

After two years of studying DOE data and some, though limited, input from independent sources, the St. Louis Site Remediation Task Force and the constituents it represents reached consensus on 1) future use of the land, 2) level of cleanup most desirable and 3) a creative, cost effective remediation approach using technology developed in DOE facilities with taxpayer dollars.

Risk, groundwater considerations, land use, cost, and other issues were considered individually for each of the affected properties. The unanimous decision of the Task Force and the community was as follows:

Unrestricted Use Guidelines	Commercial, Industrial, Recreational Use
St. Louis Airport Site (SLAPS)	Mallinckrodt Plant (SLDS)
SLAPS Vicinity Properties	Riverfront Trail
Coldwater Creek Properties	West Lake Landfill (fully encapsulated cell)
HISS/Futura Coatings	
SLDS Vicinity Properties	
Ballfields	

The Task Force agreed to use the Department of Energy's cleanup standard it applies to land designated for unrestricted use -- thorium / radium concentrations not to exceed 5 picocuries per gram (5 pCi/g) averaged over the first 15 cm of soil and 15 picocuries per gram (15 pCi/g) averaged over 15 cm thick layers of soil more than 15 cm below the surface. To clean the properties for unrestricted use to a lesser standard would not meet Applicable or Relevant, and Appropriate Requirements (ARARs) for nuclear weapons production waste remediation.

The Task Force's sensitivity to cost issues motivated a deliberate and detailed evaluation of disposal sites for the St. Louis FUSRAP radioactive waste. Existing sites in Missouri (and the possibility of fabricating a site in Missouri), commercial and DOE reservations were all considered. The short list of suitable sites included: licensed commercial disposal facilities and DOE reservations. SLAPS, the original repository site suggested by DOE, was immediately eliminated from further consideration because it exists in a floodplain and in unconsolidated sediments providing recharge to the Post Maquoketa aquifer. Any activity by DOE to develop this site as a bunker would be in violation of Executive Order 11988. Other disposal sites in the St. Louis area were eliminated for the following reasons: located in a densely populated metropolitan area, proximity to groundwater, unsuitable geologic substrata, proximity to heavily traveled roads, the threat of contaminant migration, uncontrolled accessibility, negative impact on real estate values and economic development, and the absence of an appropriate disposal facility.

According to the DOE, the estimated cost for complete excavation and commercial disposal is $778 million; the estimated cost for complete excavation and on-site disposal is $490 million. Based on information given to the Task Force by commercial disposal facilities, the transportation cost used in the DOE calculation is inflated. The Task Force also takes exception with the DOE's costs for on-site or in-state disposal because it does not take into account the cost of constructing a properly engineered (RCRA Subtitle C Standard) and monitored disposal cell nor the cost of transportation to the disposal site. It is the general view of the Task Force that the difference in cost between on-site disposal and disposal in a licensed commercial facility is not significant.

Further, the Task Force has determined that a remedial action program based on technology developed by DOE (on-site analytical characterization, selective soil sorting, and ex-situ microwave vitrification) has the potential of reducing overall cost by reducing volume and stabilizing the radioactive waste. It should be noted that the costs associated with the risk of transporting radioactive

waste are minimized by using the ex-situ microwave vitrification technology. Risk costs (contamination of haul routes by spillage or accident) are not factored into the DOE's removal and transport cost numbers.

Regardless of the cleanup methodology selected by the DOE, the St. Louis community wants the St. Louis Site cleaned to the standards specified by the Task Force for each of the FUSRAP properties.

The community – St. Louis city and county stakeholders – has agreed upon an appropriate strategy for the cleanup and removal of radioactive contaminants in St. Louis. And in response to Thomas Grumbly's request for direction on how to proceed, St. Louis wants DOE to:

1. Commit sufficient funding to continue and accelerate the cleanup of the St. Louis FUSRAP site as recommended in this report
2. Remediate and remove radioactive contaminated soil in accordance with the St. Louis Remediation Task Force's recommended cleanup performance standards and implementation strategy
3. The St. Louis Airport Site (SLAPS) should be cleaned up first
4. Establish and staff a DOE field office in St. Louis
5. Consider the use of recommended technologies to clean up the site to specified standards
6. Accelerate and expand the cleanup effort in FY 1997

Chronology of Events

1941	U.S. Army acquires by condemnation 17,000 acres in St. Charles County for TNT and DNT production -- Weldon Spring
1942, April	Mallinckrodt begins experiments using an ether extraction process to refine uranium ore
1942, May - November	Mallinckrodt refines the first 40 tons of uranium needed for the world's first self-sustained and controlled nuclear chain reaction
1942, December	The first self-sustained nuclear chain reaction is achieved by the Manhattan Engineer District (MED) at the University of Chicago. All the uranium used in the experiment was in the form of uranium oxide produced by Mallinckrodt or uranium metal produced by others using intermediate, purified uranium compounds produced by Mallinckrodt.
1942 - 1957	Mallinckrodt refines uranium at its downtown St. Louis facility
1945, August 6 & 9	Atomic bombs detonated at Hiroshima and Nagasaki, Japan
1946	MED condemns 21.74 acres near St. Louis Airport to store process wastes and residues from the Mallinckrodt plant
1946	Atomic Energy Commission (AEC) created
1947, January 3	MED acquires SLAPS site by condemnation
1946 - 1957	MED & AEC operate SLAPS to store wastes and residues - pitchblende raffinate, radium bearing wastes, barium cake residue and other process wastes
1948 - 1950	AEC finances cleanup at Mallinckrodt
1953	Fernald plant built in Ohio to meet the country's increasing processed uranium needs
1957	Mallinckrodt ceases uranium processing at the Downtown site; production activities are transferred to Weldon Springs
1957 - 1962	AEC finances cleanup at Mallinckrodt
1966, February	Uranium residues and process wastes purchased by Continental Mining and Milling from AEC
1966 - 1969	Transferring waste from SLAPS to Latty Avenue contaminates properties along haul routes
1967	AEC consolidates all its uranium processing at Fernald
1973	Radioactive barium sulfate wastes disposed of illegally in West Lake Landfill.
1973, May 15	21.7 acre SLAPS site is transferred to the City of St. Louis by Quitclaim Deed
1974	AEC establishes the Formerly Utilized Sites Remedial Action Program (FUSRAP) for cleanup of sites not owned by AEC / DOE but contaminated from past nuclear weapons activities involving radioactive materials.
1977	E. Dean Jarboe purchased 3.5 acres of land in the 9000 block of Latty Avenue to build Futura Coatings, Inc.
1980	Jarboe purchased another 7.0 acres of land adjacent to his 3.5 acres to store the radioactive waste from his original building site. The consolidated waste site is known as the Hazelwood Interim Storage Site.

Chronology of Events cont.

1981	An AEC report states that, based on the 1977 survey, Mallinckrodt plant is still contaminated
1982	DOE proposes disposing of SLAPS / Latty waste at Weldon Springs
1984	Congress (PL 98-360) directs DOE to reacquire SLAPS from the City of St. Louis for disposal of SLAPS, Latty and Vicinity property wastes
1985	Bechtel National, Inc. develops for DOE design options for disposal of SLAPS / Latty wastes at SLAPS
1988	The City of St. Louis continues to refuse to transfer the property back to the DOE as authorized under PL 98-360
1989	EPA places SLAPS and Latty on National Priorities List
1990	EPA and DOE sign the Federal Facilities Agreement governing cleanup of the St.Louis FUSRAP Site
1990, November	Defeat of general election referenda regarding consolidation and storage of radioactive waste at SLAPS -- 85.6% of St. Louis County and 80.7% of the St. Louis City residents vote NO
1992	St. Louis County Radioactive & Hazardous Waste Oversight Commission and the Mayor's Advisory Task Force on Radioactive Waste were established
1994	DOE establishes the St. Louis Site Remediation Task Force

INTRODUCTION

In August 1994, the U.S. Department of Energy (DOE) requested that the St. Louis community create the St. Louis Site Remediation Task Force to develop recommendations for the cleanup performance standards, for an implementation strategy and for investigation of specific technologies that show promise for achieving the cleanup standards.

This report was prepared by the St. Louis Site Remediation Task Force to communicate its formal recommendations to the U.S. Department of Energy regarding cleanup and removal of radioactive contaminants located at the St. Louis Formerly Utilized Site Remedial Action Program sites. The recommendations presented in this report are based in part upon the characterization data and information provided to the Task Force by DOE and its contractors.

The report also includes background information on the St. Louis FUSRAP sites. This information has been included to provide readers with an understanding of the rationale behind the Task Force's recommendations and the reasons why DOE must implement and complete the cleanup in a timely manner.

Section 1. OVERVIEW OF THE ST. LOUIS FUSRAP SITE

During the development of the nuclear weapons program beginning in the 1940s, the St. Louis community worked closely with the Atomic Energy Commission and the Manhattan Engineer District to ensure that the country's military objectives were achieved. Because timing was critical, the U.S. government placed a low priority on finding ways to treat the radioactive waste generated in the process. Beginning in the 1970s, the veil of secrecy surrounding the government's programs to advance the understanding and use of atomic energy was lifted. At that time the St. Louis community, like others throughout the country, began to raise questions and voice concerns about public health risks and environmental impacts associated with the government's radioactive waste disposal practices and policies.

For five decades an arsenal of nuclear weapons was produced leaving an unprecedented and distressing environmental legacy. At all the facilities in the United States involved in the nuclear weapons program, some environmental contamination occurred. In some cases, like St. Louis, the contamination was extensive enough to pollute not only the surrounding soil but also groundwater and surface water.

Many people are familiar with the "Manhattan Project", but few are aware of the pivotal role the St. Louis community and Mallinckrodt Chemical Works played in the production of uranium for the atomic bomb and the development of technology for more efficient refining and commercial processing. Mallinckrodt operated the only production plant for refining uranium from 1942 until 1951, when the Feed Materials Production Center was established by the Atomic Energy Commission (a predecessor of the Department of Energy) in Fernald, Ohio.

From 1942 to 1957, Mallinckrodt's development and production efforts were conducted at the company's production facilities located north of the downtown St. Louis area. In 1957, production was moved to a new facility that the Atomic Energy Commission built at the former U.S. Army TNT

Refuse From Atomic Ore Stored Here
Condemnation Suit Reveals War Use Of Tract Near Airport

A 21.74 acre tract of land north of Lambert-St. Louis Municipal Airport has been used secretly for several months for storage of "certain residue materials from the refining of uranium ores" at the Manhattan District atomic plants at the Mallinckrodt Chemical Works it was disclosed today.

The disclosure was made after a condemnation suit was filed in federal court here in behalf of the War Department to acquire possession of the land, on which the government already has an option.

Company officials and security officers refused "for security reasons" to disclose the exact nature of the stored materials, but they declared they are not radio-active and not dangerous. The material, they asserted, is the "type of refuse that any ordinary commercial firm of this type would store there." They asserted no complaints have been received on use of the land for that purpose.

There is a "remote possibility of future use" for the material, it was said, and for that reason it is being stored. A statement issued in Washington by the Manhattan District headquarters said, "Because of the long-term storage demand and possible future value of the material, it is necessary that the government own the land."

The tract is west of the Brown Rd. and north of the Wabash Railroad tracks.

The petition seeks immediate possession of the land, which is owned by Elizabeth Callaway and Mary Callaway Porcher, whose address was given as N.S Wood, Inc., real estate firm at 706 Chestnut St.

The War Department estimates value of the land at $20,000. Named as co-defendants in the condemnation proceedings are Drainage District No. 2A, St. Louis County and the St. Louis County collector of revenue.

St. Louis Post Dispatch, September 1946

production facility at Weldon Spring in St. Charles County, Missouri. In 1946 the Manhattan Engineer District condemned the 21.7 acres of land adjacent to the St. Louis municipal airport for the purposes of storing residues from the uranium processing at the Mallinckrodt facility. The site, known as the **St. Louis Airport Storage Site (SLAPS or SLAPSS)**, lies approximately 15 miles northwest of downtown St. Louis and is bounded by McDonnell Blvd. to the north and east, Banshee Road on the south, and Coldwater Creek on the west.

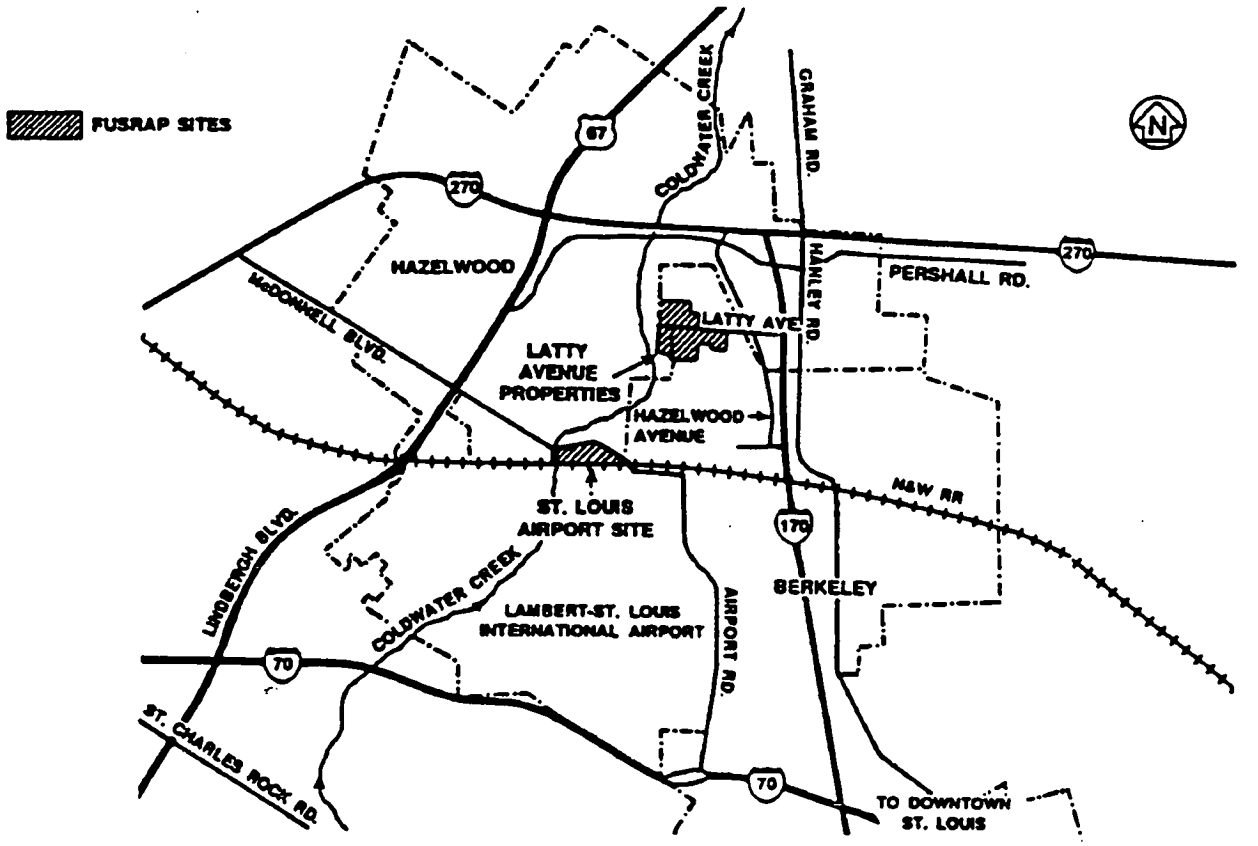


Figure 1

Pitchblende raffinate (from the former Belgian Congo), radium bearing waste, barium cake residue, dolomite liners and other process wastes were disposed of at SLAPS during processing and cleanup projects at the downtown Mallinckrodt facility undertaken from 1946 to 1962. Much of the waste that was transported to SLAPS was hauled in uncovered dump trucks. This was the primary cause of the contamination of the land along the haul routes (**Vicinity Properties**).

In 1973 ownership of SLAPS was transferred to the City of St. Louis via Quitclaim Deed. This transfer was made without knowledge of the extensive contamination at the site.

The original SLAPS ground acquired (via condemnation) by the Manhattan Engineer District was very uneven and contained a low drainage area on the western section of the site. The land had a

drainage slope from east to west, with all surface and groundwater drainage directed to Coldwater Creek at the western end of the property. In the early 1980s, it was discovered that waste was eroding into Coldwater Creek. To reduce further erosion, DOE constructed a gabion wall in 1985. Subsequent sampling, however, has uncovered elevated concentrations of thorium in sediments in the creek and in 20 foot deep monitoring wells north of SLAPS. Stormwater runoff, flooding, wind erosion and groundwater discharge into Coldwater Creek also contribute to the contamination of the creek and sediment migrating to downstream properties.

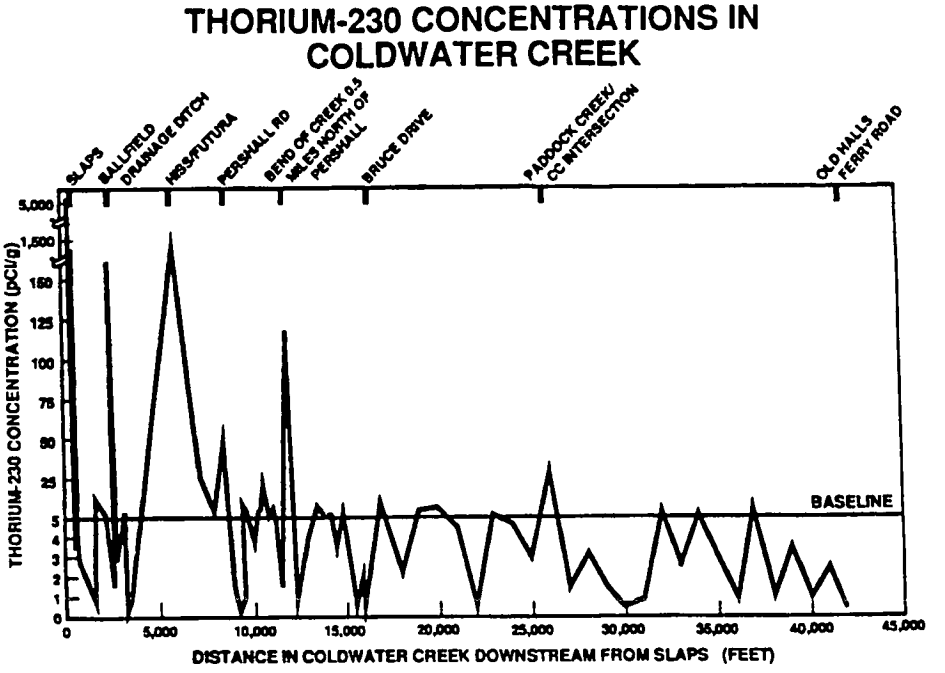


Figure 2

In 1966 the Atomic Energy Commission, after several earlier offerings, finally sold the waste at SLAPS to Continental Mining and Milling Company, which moved some of the waste from SLAPS to 9200 Latty Avenue in Hazelwood. The half-mile journey from SLAPS to 9200 Latty Avenue created additional property (**Vicinity Properties**) contamination due to spillage and inappropriate hauling protocols during transit.

The radioactive waste at SLAPS was later acquired by the Commercial Discount Corporation through a bad debt foreclosure. In 1969, Cotter Corporation assumed ownership and began shipping materials from SLAPS to its processing plant in Colorado. One year later, Cotter started drying the process waste at Latty Avenue and shipping it to Colorado. The drying process left an estimated 8,700 tons of barium sulfate at the Latty Avenue Site. In an effort to dispose of this material Cotter mixed it with 39,000 tons of topsoil and shipped it to **West Lake Landfill**. On November 1, 1974 the AEC notified Cotter Corporation that the disposal material did not meet the intent of the Commission's regulation (10 Code of Federal Regulations Part 40) concerning alteration/dilution of radioactive source material to obtain a mixture no longer subject to licensing. No further action was taken because the AEC was told that the material was buried under 100 feet of municipal waste and was unrecoverable -- it was later revealed that the material was buried under only three feet of waste.

Over the years, careless management and inadequate containment of the radioactive waste during transportation caused spills and spread the contamination to the banks of the Mississippi River, Coldwater Creek, numerous roads and railways, and about 90 vicinity properties.

In 1974, DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) to remediate sites not owned by DOE but contaminated by the government's activities involving radioactive materials. Of the 46 FUSRAP sites across the country, the St. Louis Site is the largest both in terms of acreage and quantity of radioactive waste material.

In 1977, E. Dean Jarboe purchased 3.5 acres of land in the 9000 block of Latty Avenue Three days after closing the deal, federal officials told Jarboe that his newly acquired property was contaminated with radioactive material and that he could not use the land. In order to build his company's headquarters, Jarboe purchased another 7.0 acres of land (adjacent to the 3.5 acres) in 1980. The newly acquired parcel of land was to be an interim storage site for the contaminated soil and demolished building rubble cleared from the land where he originally intended to build his company, Futura Coatings, Inc.. Jarboe expected to expand his operations on this land after the federal government removed the radioactive waste. The consolidated waste at the **Hazelwood Interim Storage Site (HISS)** is still in place awaiting removal.

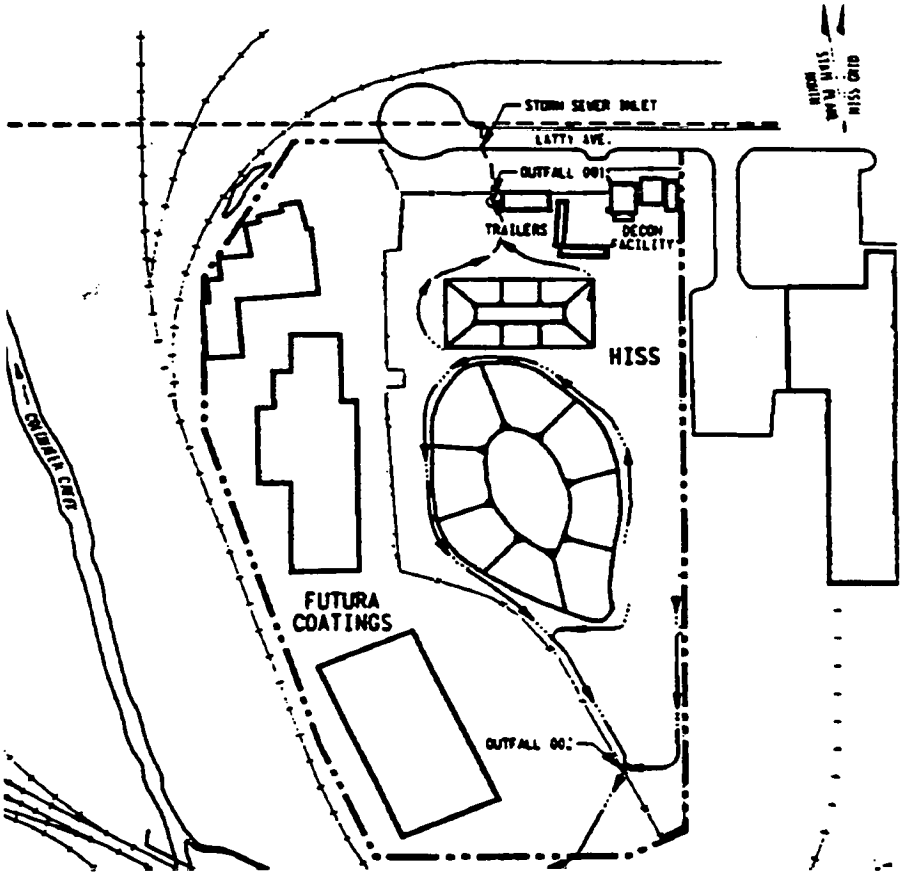


Figure 3

Formerly Utilized Sites Remedial Action Program
St. Louis, Missouri Contaminated Properties

St. Louis Downtown Site (SLDS or SLUPP) is located on the Mallinckrodt and vicinity properties in an industrial area in St. Louis city near the McKinley Bridge which crosses the Mississippi River. The total waste volume at this site is estimated to be 246,000 cubic yards. Waste is tailings and residues from high grade uranium ore processing.

St. Louis Airport Storage Site (SLAPS or SLAPSS) is about 15 miles northwest of downtown St. Louis and adjacent to the northern boundary of the Lambert-St. Louis International Airport. The waste volume at this site is estimated to be 250,000 cubic yards. Waste composition consists of radium, thorium, uranium and by-product material. This site is on the U.S. Environmental Protection Agency's *National Priorities List.*

St. Louis Airport Site Vicinity Properties consist of 78 properties along the haul routes, the Norfolk and Western Railroad, the Ballfields, and Coldwater Creek, which flows 1500 feet along the western border of the St. Louis airport site. The vicinity properties are located in the cities of Hazelwood and Berkeley. The waste volume at this site is estimated to be 90,000 cubic yards. Waste composition consists of radium, thorium, uranium and by-product material.

Latty Avenue Properties are located on Latty Avenue in Hazelwood in an industrial / commercial area approximately 0.75 miles north of the St. Louis airport. There are three buildings on the site and the Hazelwood Interim Storage Site (HISS). The waste volume at this site is estimated to be 211,000 cubic yards. Waste composition consists of radium, thorium, uranium and by-product material. HISS is on the U.S. Environmental Protection Agency's *National Priorities List.*

West Lake Landfill is located at 13570 St. Charles Rock Road in Bridgeton. It is approximately 4 miles west of the St. Louis Airport, west of the intersection of I-70 and I-270 and approximately 1.2 mile east of the Missouri River. The estimated waste volume is 48,000 cubic yards (47,700 **tons**). (Note: Although West Lake Landfill is not a FUSRAP site, the Task Force decided in the Fall of 1994 to include this property in its discussions of radioactive waste cleanup.)

The severity of the radioactive contamination's impact on the environment and the St. Louis community was acknowledged in the late 1980s when both SLAPS and the Latty Avenue Properties were placed on the Environmental Protection Agency's National Priorities List (NPL). NPL sites require that the cleanup process be in compliance with The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and that the remedy selection meet the guidelines of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

CERCLA, often referred to as Superfund, mandates the cleanup of hazardous substances that could endanger public health or the environment. CERCLA provides authority for ***cleaning up past mistakes*** that have created existing waste problems.

NPL is a list of the ***nation's worst hazardous waste sites*** determined by the U.S. Environmental Protection Agency (EPA) and targeted for long-term cleanup and evaluation as established by CERCLA.

During the first 25 years of the nuclear weapons program, the potential long-term health and environmental impacts of the program were relatively unknown. Yet, transporting waste material in uncovered trucks -- whether household trash or industrial waste -- raises serious questions about past waste management practices. What cannot be questioned is that those actions left serious environmental, health and safety issues in the St. Louis region.

"The ultimate ***disposal of contaminated waste*** – subsurface, surface and airborne – needs much more thorough study. Even the simplest of such data – recorded periodic measurements of stream pollution below the (production) plants – are almost wholly lacking. Even with such records, present knowledge of radiation and chemically toxic effects on animal and vegetable life is so limited that water supply inlets below (production) plant disposal outlets cannot be unqualifiedly recommended. The disposal of contaminated waste in present quantities and by present methods (in tanks or burial grounds or at sea) if continued for decades, ***presents the gravest of problems***."

U.S. Atomic Energy Commission Report of the Safety and Industrial Health Advisory Board
April 2, 1948

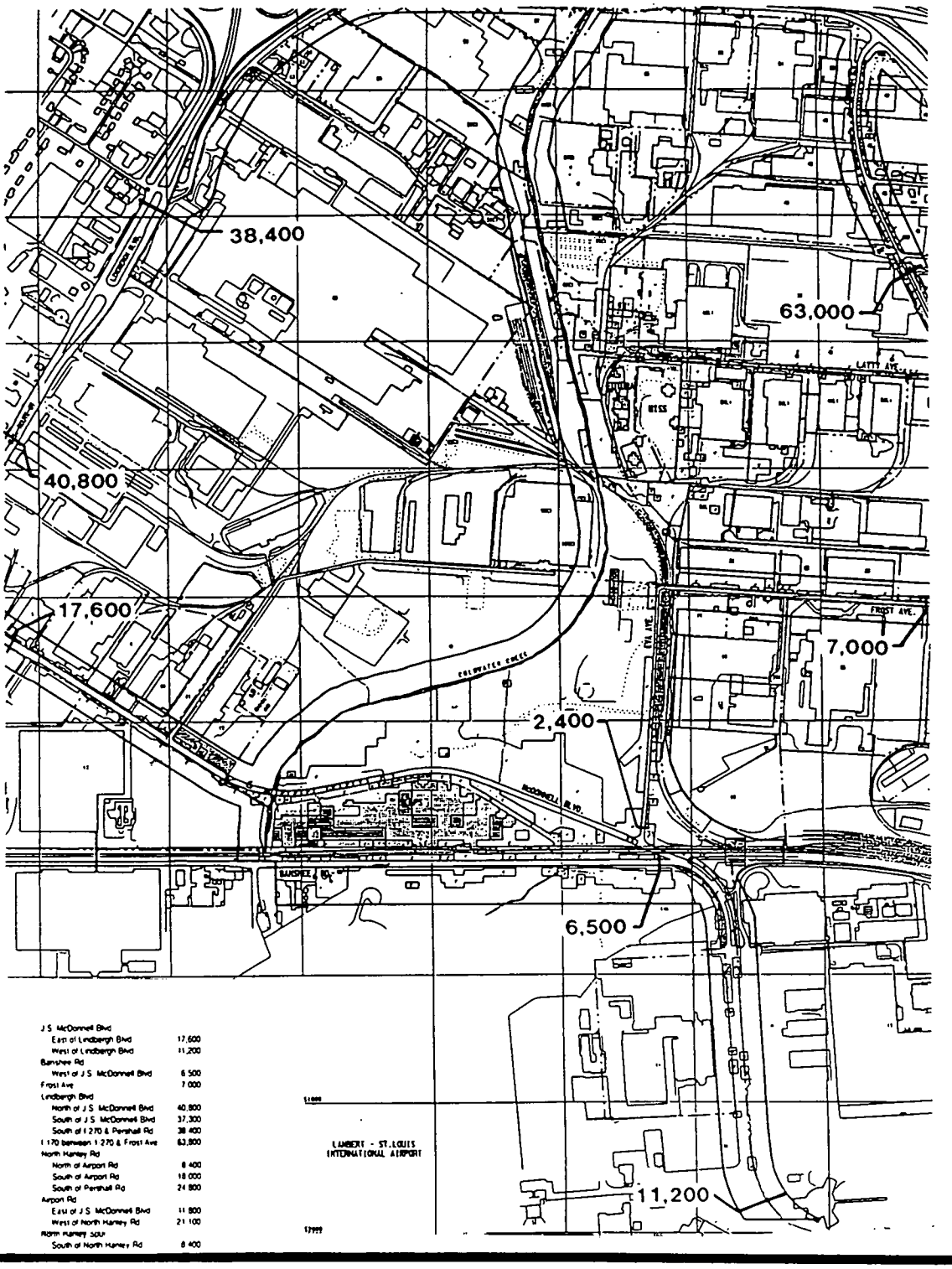
The risk from nuclear waste is measured as a combination of two factors: the chance that exposure will occur, and the consequences or harm that can result from exposure. The potential for harm or hazard from exposure to low-level radioactive waste depends on whether people, plants and animals are actually exposed to radiation and at what levels. The relationship between low radiation doses and the incidence of somatic (physical effects), genetic and teratogenic (impact on fetus and embryos) changes is difficult to trace because the latency period -- the time between exposure and effect -- is long. Other environmental factors also can confuse the issue and make it difficult to statistically trace human health conditions to radioactive exposure. However, since 1957 when the federal government first began setting allowable radiation exposure standards, cumulative data continue to suggest that progressively more stringent limits are required. (Committee on the Biological Effects of Ionizing Radiation of the National Academy of Sciences).

In the absence of certainty on radiological effects, the trend is clearly to adopt the more stringent standards. New Jersey, for example, has established a 15 millirem per year "Total Effective Dose Equivalent" (TEDE) from external radiation and intake for both unrestricted and restricted sites. New York, too, has stated that the "Total Effective Dose Equivalent" to the maximally exposed individual of the general public, from radioactive material remaining at a site after cleanup, shall be as low as reasonably achievable and less than 10 millirem above that received from background levels of radiation in any one year.

Even the Nuclear Regulatory Commission (September 29,1995 Part 20 Proposed Rule Making) has proposed a dose limit for release of a decommissioned site of 15 millirem per year "Total Effective Dose Equivalent" (TEDE) for residual radioactivity distinguishable from background. This dose level was selected to provide both a substantial margin of safety below the NRC's dose limit for members of the public and an appropriate limit for the acceptability of release of a facility which would no longer be subject to regulatory control.

The fact that the St. Louis FUSRAP site is located in a densely populated metropolitan area where the community lives, works and plays dictates that the most conservative view of health effects be adopted in making decisions affecting the cleanup options. The uncontrolled access to many parts of the St. Louis FUSRAP site and the surrounding properties increases the potential health and safety risks for a significant number of St. Louis residents – people who drive into the area to work as well as the number of families that live in North County and the number of adults and children who have access to Coldwater Creek. (See Figure 4) Similar conditions exist in North St. Louis City and around the Riverfront Trail.

Average Weekly Traffic Counts



Map courtesy of St. Louis County Planning Department

Figure 4

Coldwater Creek flows through Overland, Breckenridge Hills, St. Ann and under the St. Louis Airport. It then passes through Hazelwood, the city of Florissant and the entire Florissant Basin (a shallow oval shaped depression), unincorporated St. Louis county and along the northern edge of Black Jack before joining the Missouri River. The 47-square-mile urban watershed has an elongated shape, with a 19.5 mile channel and relatively short tributary streams. North of the airport the floodplain is essentially fully developed with single family residential and commercial development. Another noteworthy feature of the Coldwater Creek basin is the Karst sinkhole area which drains directly into the groundwater system.

A bedrock aquifer known as the Post Maquoketa aquifer lies beneath SLAPS and extends north of the site. It meets the legal definition of an aquifer and it is the only bedrock aquifer that yields potable water in the area. The water quality of the aquifer is acceptable for most domestic uses – meeting state and federal minimum drinking water requirements for purity. Other bedrock units in the general area are unacceptable potable water sources because of the high levels of total dissolved solids. Well records maintained by the Missouri State Geologist document the use of the Post Maquoketa aquifer by local residents and businesses (See Appendix E).

In addition to the potential for direct contact, opportunities for increased exposure due to the transport of contaminated material off-site by wind and surface water run-off also are increasing the health risks to the St. Louis public.

Concerns of St. Louis-based utility companies mirror the concerns of the community. St. Louis County Water Company, Laclede Gas Company, St. Louis Metropolitan Sewer District and Union Electric Company have field personnel who must periodically work in and around radioactive contaminated soils. These companies must have access to their facilities and equipment for repair and maintenance purposes. To ensure the safety of their workers, the utilities have jointly petitioned DOE to make available trained specialists to excavate, backfill and dispose of contaminated soils during utility construction, maintenance, and repair activities. Because the utilities service both residential and commercial customers in the area, including the St. Louis airport, they have asked that these specialists be available on a 24-hour emergency response basis.

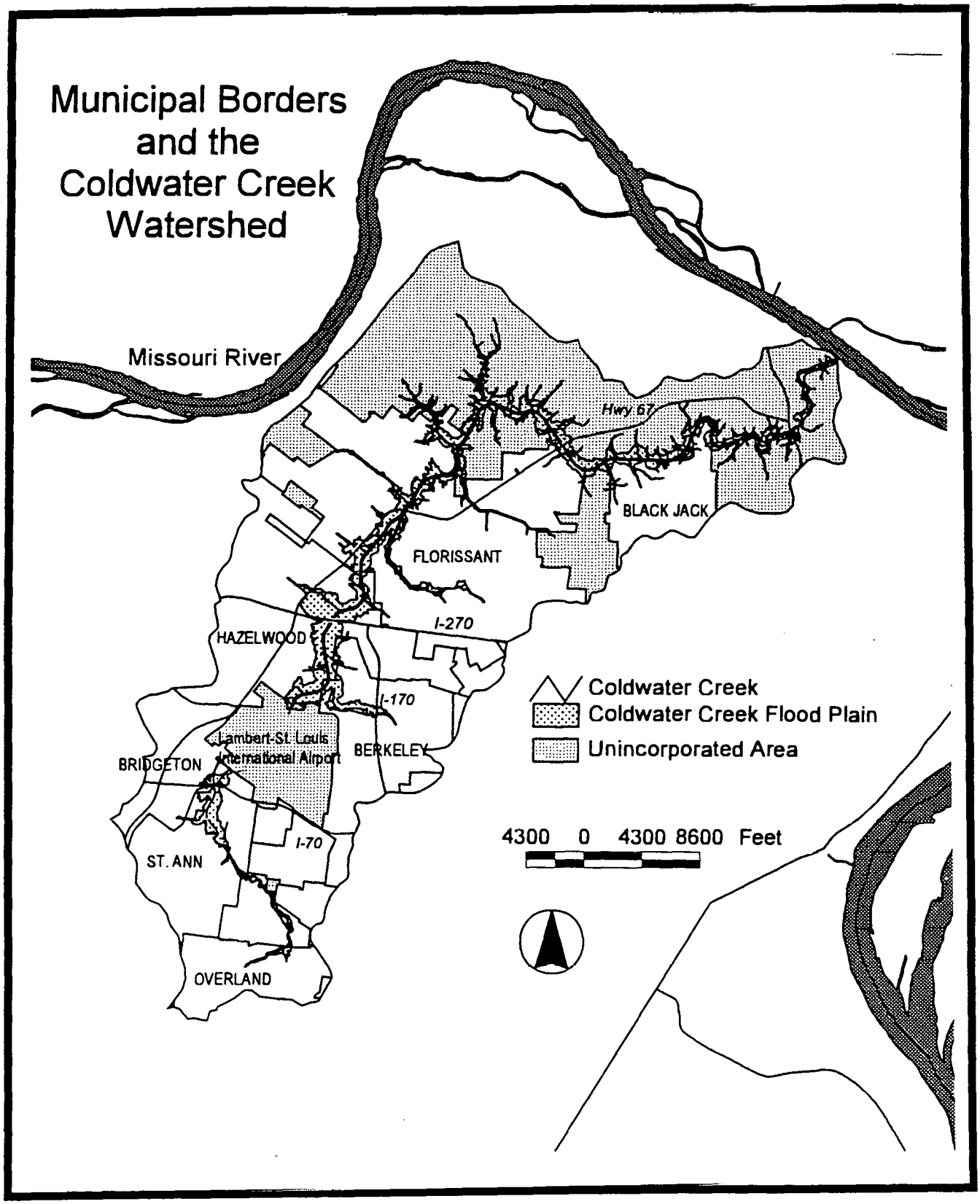
The U.S. EPA Region V's rationale in setting cleanup standards for the Kerr-McGee National Priorities List properties in West Chicago, Illinois is applicable to the St. Louis FUSRAP Site. In the case of the Kerr-McGee cleanup, there were no established regulatory requirements directly applicable to thorium mill tailings contamination (containing thorium, uranium, radium and heavy metals). So, relevant and appropriate cleanup criteria were extracted from appropriate and relevant federal and state regulations -- Title 40, Part 192 of the Code of Federal Regulations (40 CFR 192) titled "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings", Title 10, Part 20 of the CFR entitled "Standards for Protection Against Radiation", U.S. Nuclear Regulatory Commission's Regulatory Guide 8.37, Department of Energy Order 5400.5 titled "Radiation Protection of the Public and the Environment" and the associated state regulations of Title 32 Chapter II Subchapter b Part 332 of the Illinois Administrative Code titled "Licensing Requirements for Source Material Milling Facilities." In accordance with these guidelines, Kerr-McGee is required to excavate and transport to a permanent disposal facility all of the radioactive contaminated material in excess of 5 pCi/g above background of total radium at any depth. (When the federal standards in 20 CFR 192 were developed, the 5 pCi/g standard was established as a health based standard. The 15 pCi/g standard for subsurface soil was technology based, reflecting instrument limitations in locating subsurface deposits.) Additionally, use of the concept of "As Low As Reasonably Achievable" (ALARA) is being

applied for the residential properties included in the Kerr-McGee Sites cleanup. These criteria would allow the Kerr-McGee Sites to be released for unrestricted use. In the opinion of state and federal regulators, cleanup of the Kerr-McGee Site to less restrictive criteria would not provide adequate long-term protection of public health and the environment.

According to the DOE, the estimated cost for complete excavation and commercial disposal for the St. Louis FUSRAP Site is $778 million; the estimated cost for complete excavation and on-site disposal is $490 million. Based on information given to the Task Force by commercial disposal facilities, the transportation cost used in the DOE calculation is inflated. The Task Force also takes exception with the quoted cost for on-site or in-state disposal because it does not take into account the cost of constructing a properly engineered (RCRA Subtitle C Standard) and monitored disposal cell nor the cost of transporting the material to the disposal site. The general opinion of the Task Force is that cost of complete excavation and removal to a commercial facility are reasonable and affordable based on commercial assessments of current and long-term cost projections.

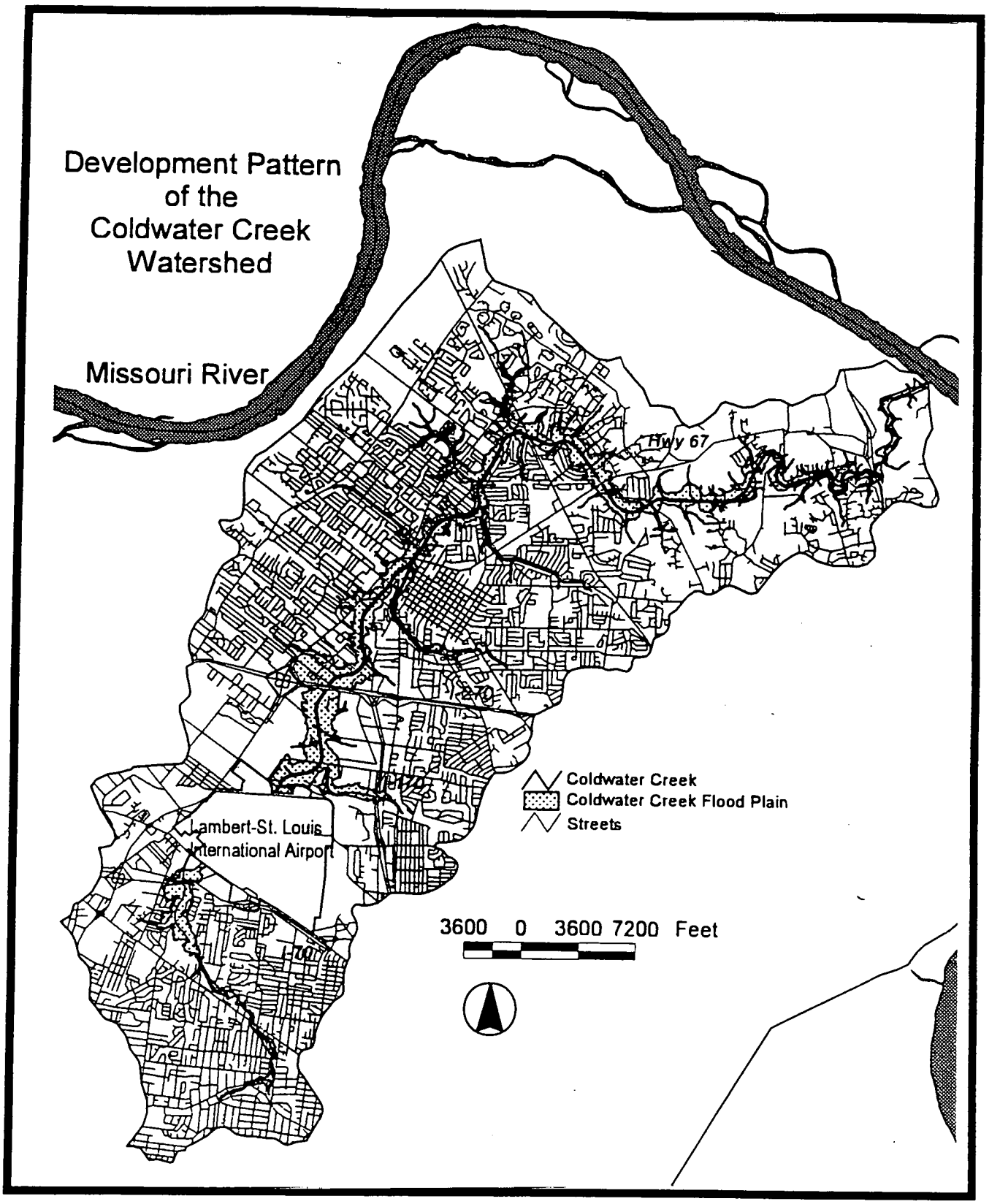
Further, the Task Force has determined that a remedial action program based on technology developed by DOE (on-site analytical characterization, selective soil sorting, and with ex-situ microwave vitrification) has the potential of reducing overall cost by reducing volume and stabilizing the radioactive waste. It should be noted that the costs associated with the risk of transporting radioactive waste are minimized by using the ex-situ microwave vitrification technology. Risk costs (contamination of haul routes by spillage or accident) are not factored into the DOE's removal and transport cost numbers.

Regardless of the cleanup methodology selected by the DOE, the St. Louis community wants the St. Louis Site cleaned to the standards specified by the Task Force for each of the FUSRAP properties.



Map courtesy of St. Louis County Planning Department

Figure 5



Map courtesy of St. Louis County Planning Department

Figure 6

Section 2. TASK FORCE ORGANIZATION AND PROCESS

Since 1990, the St. Louis community has expressed ongoing opposition to DOE's proposal to consolidate and store radioactive waste from the St. Louis Site at the airport. A Stakeholder's Summit meeting was called which resulted in the creation of the St. Louis Site Remediation Task Force. Thomas Grumbly[1], former DOE Assistant Secretary for Environmental Management, proposed an open, collaborative process involving all identifiable stakeholders to develop a community-based vision concerning remediation of radioactively contaminated sites in St. Louis City and County, collectively known as the St. Louis FUSRAP Site. He proposed that this process integrate scientific and social concerns and that an effective, cost-sensitive solution be developed that would be "substantively the best one for this community."

Citizen opposition results in November 1990 General Election Referenda regarding consolidation and storage of radioactive waste at SLAPS

St. Louis County – Advisory Proposition No.1
Should the United States use what is commonly called the Airport site for the construction of a permanent radioactive waste bunker?
Electorate response: 85.6% voted NO

St. Louis City – Non-Binding Preferential Proposition
Should a radioactive waste bunker be constructed on real property owned by the City of St. Louis, commonly known as the St. Louis Airport Storage Site ("SLAPS"), or on any site within the corporate limits of the City of St. Louis for the purpose of permanently storing radioactive waste generated by production of nuclear weapons, which waste is currently located at SLAPS, at 9200 Latty Avenue in the City of Hazelwood, at the Mallinckrodt Chemical Works facility at Second and Destrehan Streets in the City of St. Louis, and at related sites?
Electorate response: 80.7% voted NO

The first meeting of the Task Force occurred on September 13, 1994. It was attended by members of the St. Louis County Radioactive and Hazardous Waste Oversight Commission (County Commission) and the St. Louis City Mayor's Advisory Task Force on radioactive waste (City Commission), both of which were organized in 1992. The Task Force also included representatives of the St. Louis County Executive, the Mayor of St. Louis City, the Cities of Hazelwood, Berkeley, Bridgeton and Florissant, the Missouri Department of Natural Resources, the U.S. Environmental Protection Agency, Offices of U.S. Congressmen James Talent and William Clay, St. Louis Lambert International Airport, Mallinckrodt, and utility companies. Property owners, civic and environmental groups, and other concerned citizens also were participants. DOE's site manager served as ex-officio.

At meetings held during the fall of 1994, the Task Force discussed and agreed upon a mission to identify and evaluate feasible remedial action alternatives for the cleanup and disposal of radioactive waste materials at the St. Louis FUSRAP site and at West Lake Landfill. The St. Louis community's primary concern was the development of a long-term cleanup strategy that first and foremost protected the health and well-being of the citizens and the environment, and ultimately provided DOE with a plan of action for implementation. In deliberating possible strategies the Task Force identified

[1] Currently, Thomas Grumbly serves as Under Secretary of the Department of Energy.

issues/criteria that they would consider in weighing what cleanup strategy was most appropriate. (Figure 7)

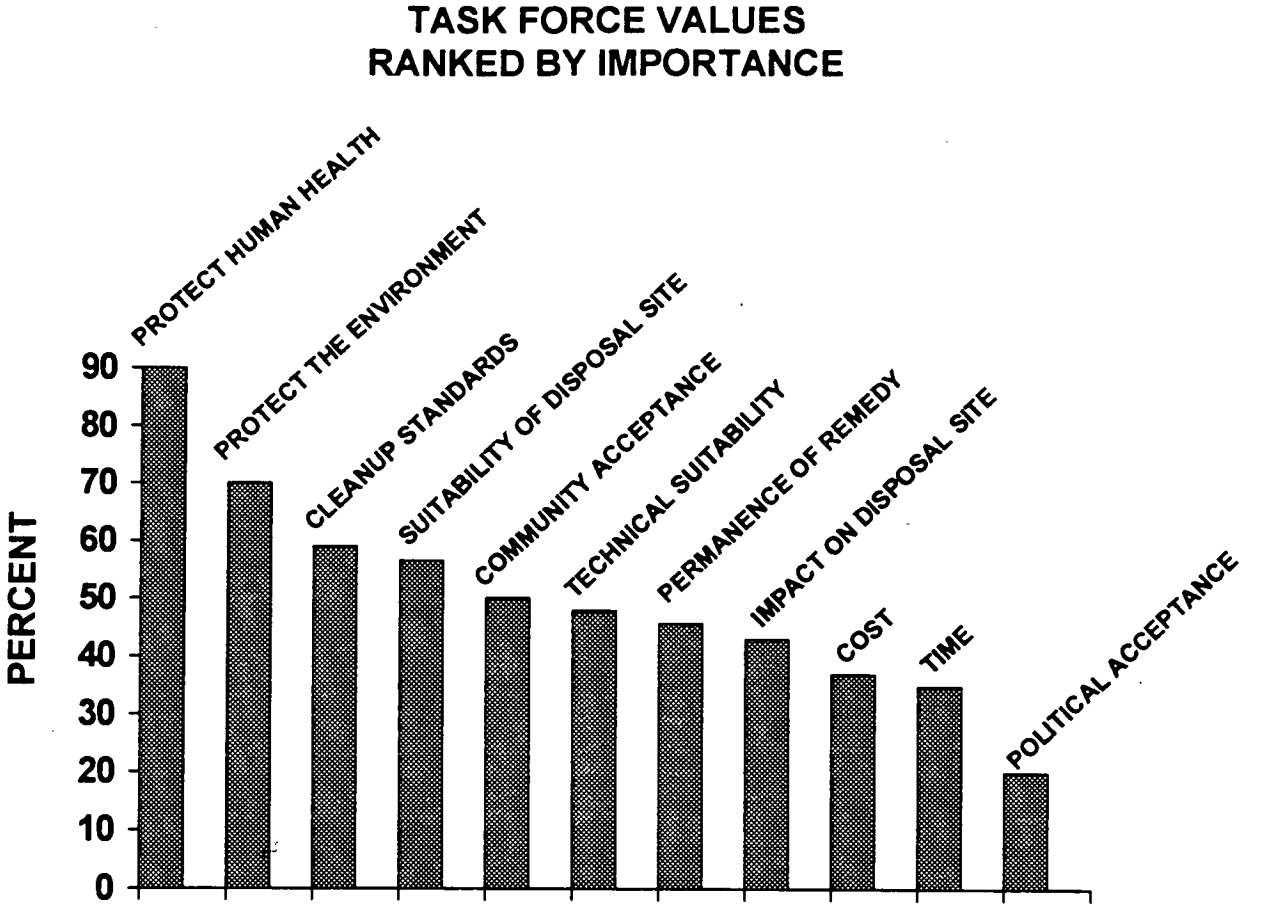


Figure 7

The Task Force agreed that working groups would be established to provide an ongoing forum for focused in-depth analysis and discussion of specific issues because of the number, diversity and complexity of the issues to be considered. (See Working Group Summaries, Chapter III Section 5 for details). Each working group met as needed between the regular monthly meetings of the Task Force and reported findings and recommendations for consideration and action by the Task Force. While substantial responsibility was delegated to these groups, final decision-making authority remained with the Task Force.

Other interested parties were provided an opportunity to speak during the public comment period at each of the Task Force meetings and/or to participate in the working groups.

Section 3. FACTORS AFFECTING RECOMMENDATIONS

The Task Force considered many relevant factors in developing recommendations for the cleanup performance standards, implementation strategy and technology preferences. Key to the recommendations were matters related to protection of human health and the environment, cost of cleanup versus institutional controls, current and future land uses, socio-economic development and environmental justice. The following is a detailed list of factors considered:

- Evidence of radioactive contaminants in numerous uncontrolled and accessible settings in a highly populated metropolitan area
- Worker health and safety risks – those who have unavoidable contact with and exposure to contaminated soils in performing their jobs
- Elevated health risks to residents and workers including increased risk of cancer, leukemia and other life-shortening afflictions and potential for cell damage leading to endocrine, immune and reproductive system disorders, genetic defects and hereditary birth defects
- Ongoing contamination of Coldwater Creek via groundwater migration and surface water runoff
- Improperly deposited waste in an urban flood plain
- Contamination of numerous commercial and residential properties in a densely populated metropolitan area of 2.4 million people
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) dictating a maximum allowable radioactivity (above background) of 5 picocuries per gram of thorium and radium at the surface and 15 picocuries per gram in subsurface cleanup standard for unrestricted property use
- Concern that capping would not offer sufficient protection against potential exposure to subsurface contamination
- Information that other states including Illinois, New Jersey and New York have adopted and applied stringent exposure guidelines for cleanup of radioactive waste
- Evidence of contaminant migration via air, surface water and groundwater
- Impact on real estate values
- Contamination from waste generated by federal nuclear weapons development and production in excess of DOE contamination restricts present and future land use
- Potential liability issues and other economic, social and physical hardships presently imposed on affected property owners and municipalities
- Need for long-term (in perpetuity) use of institutional controls including monitoring, management support, and possible additional environmental assessments

- Need for complete cost estimates for excavation and removal to a commercial facility; commercial entities suggest DOE cost estimates are inflated – in-state disposal costs do not include cost of constructing an appropriate facility or the cost of transporting the material to the site

- Consensus of the community

State regulatory factors that influenced the selection of recommended disposal options included:

- Missouri Department of Natural Resource's (MDNR) requirement that radioactive contaminants be exhumed from beneath the water table and removed from flood plains

- MDNR's not allowing disposal of radioactive contaminants in a 100-year flood plain

- MDNR's requirement that any radioactive contaminants that remain in Missouri be stored above ground at a suitable site in a fully engineered (RCRA Subtitle C standards) and monitored cell

- The absence of any qualifying facility in Missouri with capacity to accept radioactively contaminated material from the St. Louis FUSRAP Site

U.S. Environmental Protection Agency factors (CERCLA requirements) that influenced the selection of recommended disposal options included:

- Overall protection of human health and the environment
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)
- Long-term effectiveness and permanence
- Short-term effectiveness
- Reduction of toxicity, mobility and volume
- Implementability
- Cost
- State acceptance
- Community acceptance

Other factors considered in the development of recommendations included:

- Estimated cost and time required to design and construct a storage cell in Missouri

- Existence of licensed facilities outside of Missouri with adequate disposal capacity

- Competitive pricing from licensed commercial disposal facilities

Section 4. CONCLUSIONS AND RECOMMENDATIONS

- **Cleanup Performance Standards**

The specific cleanup performance standards for implementation at the St. Louis FUSRAP site, adopted by consensus of the Task Force are:

Remediate the properties listed below for unrestricted use -- thorium / radium concentrations not to exceed 5 picocuries per gram (5 pCi/g) above background levels averaged over the first 15 cm (6 inches) of soil, and 15 picocuries per gram (15 pCi/g) averaged over 15 cm thick layers of soil more than 15 cm below the surface.

St. Louis Airport Site
Ballfield Site (north of McDonnell Blvd.)
North County and St. Louis City Vicinity Properties and Haul Routes
Hazelwood Interim Storage Site / Futura Coatings
Coldwater Creek

Clean the properties listed below for site-specific use -- specific cleanup levels to be determined

St. Louis Downtown Site - industrial and commercial use standards
West Lake Landfill - industrial and commercial use standards (fully encapsulated cell)
City Levee (Riverfront Trail) - recreational use standards

- **Implementation Strategy**

The Task Force adopted the following resolution on July 23, 1996:

"The St. Louis Site Remediation Task Force hereby notifies the U.S. Department of Energy that the St. Louis Airport Site (SLAPS) ranks as our highest priority for remediation. We request that the DOE start the cleanup of the site in Fiscal Year 1997 for its eventual release for 'unrestricted use' -- that is, with excavation and removal from surface soils of thorium/radium concentrations above 5 picocuries per gram, and from below-surface soils, above 15 (Task Force Option 4).

"Further, the Task Force requests that remediation for 'unrestricted use' continue or begin at all North County and St. Louis City vicinity properties and haul roads, including utility corridors; the Hazelwood Interim Storage Site / Futura Coatings, the Ballfields on McDonnell Blvd., and Coldwater Creek (not necessarily in that order).

"Further, the Task Force requests that remediation at the St. Louis Downtown site and the City Levee continue or begin with cleanup to 'site specific' standards for industrial or recreational use, respectively.

"And finally, with respect to those radioactive wastes at West Lake Landfill which were also generated at the St. Louis Downtown Site for nuclear weapons production, from 1942-1957; the Task Force requests that the DOE, in consultation with the U.S. Environmental Protection Agency (lead agency at West Lake) and the Missouri Department of Natural Resources, develop a plan for the excavation and removal of these wastes to a minimum of the Option 3 [hot spot removal and implementation of ongoing institutional controls] Cleanup Level."

- **Technology Preferences**

The Task Force adopted the following resolution on August 20, 1996

"After reviewing the U.S. Department of Energy's database of remediation technologies, the St. Louis Site Remediation Task Force has determined that the use of ex-situ microwave vitrification coupled with gamma ray spectroscopy and laser ablation nebulization spectroscopy in a continuous field process shows promise for (1) achieving the cleanup standards specified by the Task Force, (2) reducing volume, and (3) stabilizing the radioactive waste.

"We request that the DOE evaluate the merits and field protocols of the aforementioned technologies in a field demonstration on the 21.7 acres at SLAPS during FY 1997.

"Further the Task Force requests that the remediation demonstration include appropriate engineering controls to prevent [any further] contamination of the water beneath SLAPS and ensure that air quality is not compromised by the emission of radon gas, volatile contaminants or particulates present in the soil and that worker health and safety guidelines are strictly adhered to during the demonstration.

Finally the Task Force would like the stabilized waste resulting from the demonstration shipped to a facility licensed for the disposal of radioactive waste."

- **Funding**

The U.S. Department of Energy should secure sufficient funding to continue and accelerate the cleanup of the St. Louis FUSRAP Site as recommended in this report. The St. Louis community and its leaders want DOE to expand the cleanup program starting in 1997.

Section 1. Working Group Summaries

Alternative Sites Working Group III-2
To identify and evaluate potential sites for disposal of radioactively contaminated waste from the St. Louis FUSRAP site

Health Risks/Cleanup Standards Working Group III-5
To consider potential health risks posed by the presence of radioactive contamination at the St. Louis FUSRAP Site and to define cleanup standards

Priorities Working Group III-6
To evaluate each component of the St. Louis FUSRAP Site and to develop recommendations, based on Task Force values for the priority of cleanup

Remediation Alternatives Working Group III-8
To identify potential remediation options for each component of the St. Louis FUSRAP Site, to evaluate the merits of each and to recommend site-specific remediation standards to the Task Force

Technologies Working Group III-17
To screen all known technologies and to identify and evaluate those that may be potentially suitable for application at the St. Louis FUSRAP Site

Communications Working Group III-19
To develop a communication plan and a public meeting plan designed to achieve the broadest possible public awareness of and participation in Task Force decision making and to solicit public comment on Task Force recommendations to DOE

Membership Working Group III-20
To identify potential stakeholders and to invite broad participation in Task Force activities

ALTERNATIVE SITES WORKING GROUP

The Alternative Sites Working Group met initially on December 28, 1994 and on 17 subsequent occasions for the purpose of identifying and evaluating potential sites for disposal of the radioactive wastes present at the St. Louis FUSRAP Site and related wastes at West Lake Landfill.

The group studied the technical requirements (site suitability and design criteria) for land disposal facilities as recited in the Code of Federal Regulations and analyzed available data concerning estimated volumes and characteristics of contaminants present at the St. Louis FUSRAP Site.

The group initially identified 10 potential disposal sites (later expanded to 11) and developed a set of assumptions and definitions to be used in evaluating the suitability of each site for the disposal of St. Louis radioactive waste. Each disposal site was ranked using a scale of 1 to 5 (1 = nonconforming site and 5 = site closely fitting criteria) in four main categories and 10 subcategories. The ratings were then weighted in each category to reflect the values and priorities established by the Task Force. (See Task Force Summary Section III) For example, factors relating to protection of human health and the environment were assigned greater weight than those of timing and cost. Aggregate scores were then compiled and the sites were ranked in order of preference.

The 11 disposal sites evaluated were:

Hazelwood Interim Storage Site (HISS)
St. Louis Airport Site (SLAPS)
St. Louis Downtown Site (SLDS)
Weldon Spring Site Remedial Action Project (WSSRAP)
Union Electric Surplus Property - Callaway County, MO
"New" Missouri Site[2]
Dawn Mining Co. Site (Ford, Washington)
Envirocare Site (Clive, Utah)
DOE Nevada Test Site
DOE Oak Ridge Reservation (Tennessee)
DOE Hanford Reservation (Washington)

The criteria used to evaluate the relative merits of each site were:

- Site Suitability -- geology / hydrogeology, local area impact, capacity, current status
- Timing -- approval, construction
- Cost -- transportation, disposal
- Community Issues -- acceptance, economic impact

[2] A disposal site that currently does not exist but might be found by a comprehensive study -- a hypothetical site.

Each site was graded in each category using a numerical rating system:

0 - Unacceptable / Infeasible
1 - Bad site
2 - Poor site
3 - Neutral site
4 - Satisfactory site
5 - Good site
? - Unknown

Based on this ranking system (Figure 9), the Working Group concluded that the 11 sites fell into three distinct categories of suitability:

Suitable Sites:	Dawn Mining Site - licensed commercial disposal facility
	Envirocare Site - licensed commercial disposal facility
	Hanford Reservation - DOE site
	Nevada Test Site - DOE site
	Oak Ridge Reservation - DOE site
Potentially Suitable Sites:	"New" Missouri Site
	Weldon Spring Site
	Union Electric Surplus Property – Callaway County, MO
Unsuitable Sites:	Hazelwood Site (HISS)
	St. Louis Airport Site (SLAPS)
	St. Louis Downtown Site (SLDS)

The Working Group presented its draft report to the Task Force on April 18, 1995 and supplemented that information with an oral report on the suitability of the Dawn Mining Site on May 21, 1996. In general, the sites that were determined to be suitable shared characteristics that distinguish them from the others on the list. These include remote locations away from population centers, adequate distance from flood plains, adequate protection of groundwater, generally favorable climatic conditions, the existence of radioactive contaminants and controlled, monitored facilities.

The unsuitable sites, all of which are in St. Louis City or St. Louis County, were eliminated from consideration for the following reasons: they are located in a densely populated metropolitan area, within a flood plain, proximity to groundwater, proximity to heavily traveled roads, ease of accessibility, the threat of migration of contaminates via air, soil and water, unsuitable geologic substrata, negative impact on real estate values and economic development, and the absence of appropriate disposal facilities.

Within the State of Missouri, several sites exhibited physical characteristics that rendered each potentially suitable for the disposal of radioactive waste. They were excluded, however, from further consideration because of the absence of political support and a willing host. In particular, Union Electric Company did not agree with the inclusion of its land in Callaway County on the list of potentially suitable sites for several reasons. First, about 500 acres of the Callaway site are used for the generation of electricity by a nuclear power plant. The adjacent 6500 acres is under lease to the

Missouri Department of Conservation for use as a wildlife refuge and nature preserve. Under the Low-level Radioactive Waste Policy Amendments Act of 1985 and the Midwest Low Level Radioactive Waste Compact, DOE waste cannot be commingled with Callaway Plant waste and the DOE waste cannot be deposited at a Midwest Compact site. The Nuclear Regulatory Commission also discourages locating a low level radioactive disposal facility near nuclear power plant sites. Union Electric clearly indicated that it will oppose any effort to move contaminated wastes to the site. It is Union Electric's opinion that a thorough study of other sites in Missouri ("New" Missouri Site) would reveal that other locations meet or exceed the minimum standards established by the Altemative Sites Working Group and would rank higher in suitability than Callaway.

There were others in the Working Group who disagreed with Union Electric's view. Some members of the Working Group felt that the geology and hydrology of the Callaway site are adequate for the construction of an above-ground low-level radioactive waste facility. In the event that the Midwest Compact is unable to find a willing host state, the Union Electric surplus Callaway property might be a reasonable site to store all of Missouri's low-level radioactive waste because it is located in the center of the state, away from major population areas and surface water. Since the Callaway nuclear power plant produces over 90% of the state's nuclear waste, it would be reasonable to consolidate all Missouri's radioactive waste in one location.

It is important to note that the Working Group, in general, favored shipping the FUSRAP waste to an existing licensed commercial disposal site. The Callaway property or any other Missouri site should only be considered if no other options are available.

While the primary task of the Working Group was to identify and evaluate potential disposal sites, the Group also considered the challenges of the remediation and disposal process. The Group discussed cost/benefit issues, availability, risk and funding in the context of implementing a long-term, cost-sensitive solution.

Finally, the working group concluded that it would not recommend a specific site as being appropriate for disposal of the St. Louis wastes.

Members participating in this group included:

Sally Price, County Commission
Kay Drey, County Commission
Jack Frauenhoffer, City Commission
Donovan Larson, St. Louis County Water
Eileen O'Connor, Union Electric
Tom Binz, Laclede Gas Company
Jan Titus, St.Louis Lambert Airport
Dan Tschirgi, Missouri Department of Natural Resources
Bob Geller, Missouri Department of Natural Resources
Mitch Scherzinger, Missouri Department of Natural Resources
Dan Wall, EPA
Tom Horgan, Office of U.S. Representative Talent

Other participants included:

Glenn Carlson, Attorney

HEALTH RISKS/CLEANUP STANDARDS WORKING GROUP

The Health Risks/Cleanup Standards Working Group met on March 13, 1995 for the purposes of evaluating the potential for human health and environmental risks and to define cleanup standards.

David Adler presented an overview of current DOE cleanup standards for radioactive contamination in soil and how they evolved over the years. Following Adler's presentation there was extensive discussion concerning the risks to human health and the environment by the radioactive materials and their decay products found throughout the St. Louis FUSRAP Site.

It was agreed unanimously that the radioactive cleanup guidelines used by DOE for the release of properties for unrestricted use (as specified in DOE Order 5400.5 - Radiation Protection of the Public and the Environment) are appropriate and applicable to the St. Louis Site and were recommended to the Task Force on April 18, 1995.

> Guidelines for residual concentrations of Ra-226 and -228 and Th-230 and -232 in soil are: 5 picocuries per gram (5 pCi/g) averaged over the first 15 cm of soil and 15 picocuries per gram (15 pCi/g) averaged over 15 cm thick layers of soil more than 15 cm below the surface.

Any cleanup level less protective would not meet the Applicable or Relevant and Appropriate Requirements (ARARs)

Members participating in this group included:

Dave Adler, DOE
Kay Drey, County Commission
Barry Siegel, M.D., County Commission
Jim Grant, Mallinckrodt
Dan Tschirgi, Missouri Department of Natural Resources

Other participants included:

Michael Hutcheson
Chuck Jenkins, Bechtel National, Inc.
Andrei Laszlo, Washington University
Henry Royal, M.D., Washington University

PRIORITIES WORKING GROUP

The Priorities Working Group met for the first time on March 8, 1995 and on thirty-four subsequent occasions for the purpose of identifying and evaluating all the contaminated sites in St. Louis and recommending cleanup priorities to the Task Force. While the principal objective of this group was to develop long-term cleanup priorities for each component of the St. Louis Site, it also served as a forum for discussion and debate concerning near-term cleanup actions, whether proposed by the Task Force or DOE, and requests for immediate action by property owners and other affected parties.

For example, Clark Food Service, Quaker State, Rykopf-Sexton, Inc. and Alfred Fleischer each had real estate deals pending and requested site characterization and cleanup actions in order to complete the transaction. To handle future requests of this nature, the Working Group established a standardized procedure and questionnaire for evaluating and prioritizing cleanup activities.

Evaluation Criteria

1. Is there documentation of an internally approved project (e.g., property sale, proposed improvements, new installation) by the proponent?
2. Is the proposed action technically feasible?
   a) Is the property subject to recontamination from another source?
   b) What is the estimated cost to remediate?
   c) Are reliable chemical and radioactive characterization data available?
   d) Will the proposed action result in release of the subject property without use restrictions?
3. If it is not cleaned up, would contamination on this property potentially contaminate other properties?
4. Is the proposed action consistent with Task Force values (social and economic benefits)?
5. Is adequate lead time for planning provided?

The group devoted time and effort in determining the appropriate use of funds allocated by DOE to St. Louis FUSRAP in fiscal year 1996 – approximately $15 million. Those recommendations were presented to the Task Force and adopted in September, 1995.

Allocations	Fiscal Year 1996 Recommendations
$ 200,000	Evaluate use of local disposal facilities for minimally contaminated soils
$ 200,000	Identify and evaluate suitable location(s) for a new in-state disposal or interim storage facility
$ 4,000,000	Remove contaminated soils from haul route properties located in North County
$ 5,500,000	Restore and stabilize airport-owned properties, including Ballfields
$ 4,000,000	Continue cleanup efforts of the St. Louis Downtown Site (SLDS)
$ 100,000	Continue treatability investigations

The recommendations were amended in June 1996 as follows: continue cleanup of vicinity properties in North County; continue monitoring SLAPS; set up procedures for utility emergency response; perform maintenance at SLAPS; and clean up the Riverfront Trail for recreational use.

Expenditures	1996 Activities / Projects
$1,900,000	St. Louis FUSRAP project operations, maintenance, monitoring
$5,500,000	Restore and stabilize a portion of the haul routes; build a RR staging area
$6,500,000	Continue cleanup efforts of the St. Louis Downtown Site (SLDS)
$500,000 (est.)	Riverfront Trail - work in progress
$350,000*	Coldwater Creek Panel

* Previous communications indicated the total cost for the Coldwater Creek panel was $700,000. Subsequent correspondence from Bechtel National, Inc. states that the number was in error – $350,000 for overall Task Force support , not Panel support only.

Before meaningful progress could be made on the development of cleanup strategies or priorities, the Working Group felt that issues associated with both surface water runoff and groundwater beneath the SLAPS site must be addressed.

Using the report from the Coldwater Creek Panel proved to be significant in the debate regarding both appropriate remedial actions (at SLAPS and elsewhere) and overall cleanup priorities. It indicated that insufficient data exist to make any judgments regarding the long-term health and environmental effects of the contamination. Thus, the group recommended that Coldwater Creek be cleaned up to the most stringent levels to minimize health and safety risks and to halt ongoing contamination of Coldwater Creek and downstream properties. (See IV-6 for more detailed information on the panel and its findings.)

While the Coldwater Creek Panel was deliberating, the Priorities Working Group continued to gather information and discuss other issues related to the prioritization of cleanup efforts in FY 96.
The final cleanup priorities (1 = highest priority) recommendation presented to the Task Force was as follows:

1. St. Louis Airport Site / Ballfields
2. St. Louis Downtown Site / St. Louis Downtown Vicinity Properties / Riverfront Trail
3. North County haul routes / Latty Avenue Vicinity Properties
4. Hazelwood Interim Storage Site / Futura Coatings
5. Coldwater Creek
6. West Lake Landfill

Members participating in this group included:

Kay Drey, County Commission
Sally Price, County Commission
Art Jackson, County Commission
Anna Ginsburg, City Commission
Jack Frauenhoffer, City Commission
Bob Boland, Mallinckrodt
Tom Manning, Hazelwood
Lori Batton, Berkeley
Josh Richardson, Berkeley
Christina Flynn, Berkeley
Jean Montgomery, Berkeley
Norm Erickson, Berkeley resident
Mitch Scherzinger, Missouri Department of Natural Resources
Bob Geller, Missouri Department of Natural Resources
Jan Titus, St. Louis Lambert Airport
Dan Wall, U.S. EPA
David Adler, DOE
Michael Garvin, City Commission
Donovan Larson, St. Louis County Water
Tom Binz, Laclede Gas Company
Tim Venverloh, Laclede Gas Company
Dennis Henson, Union Electric
David Braun, Union Electric
George Eberle, Grace Hill Neighborhood Assoc

REMEDIATION ALTERNATIVES WORKING GROUP

At the February 20, 1995 Task Force meeting it was proposed and agreed that a series of meetings, open to all Task Force members and other interested parties, would be held for the purpose of organizing and defining a range of potential remediation options for each component of the St. Louis FUSRAP Site in order to enable the Task Force to consider detailed options and select preferred cleanup plans for each contaminated area.

Over the course of five working sessions, the Working Group segregated the St. Louis FUSRAP Site into 11 discrete component sites based on distinguishing characteristics such as degree of contamination, estimated volume of contaminants, current land use, accessibility and anticipated future land use. The recommended remediation plans and objectives by component site are listed below:

St. Louis Downtown Site (SLDS)

Objective:	Release of land for full use as factory, warehouse, offices
Remediation Plan:	Decontaminate and/or dismantle buildings; hotspot removal & protective cover; removal of contaminants to depth permitting general excavation for maintenance without concern
Cleanup Level(s):	Clean up to standards suitable for industrial or commercial use
Interim Measures:	Establish interim storage plan for handling contaminated material generated during remediation activities; control incoming and outgoing migration of air/surface water/soil; maintain fencing; add signs; ongoing public and employee awareness and educational programs
Long Term Management:	Fence, signs; maintain cover of asphalt or rock; compensation for damages and loss of use of property; public and employee awareness and education programs (ongoing); monitoring: a) access to property b) environmental conditions; prevention of migration (soil and water); flood control measures; DOE accepts responsibility for soil excavated during maintenance and development; suitable aesthetics; compensate for economic benefits foregone (opportunity costs); DOE retains responsibility, liability (perpetual caretaker status); financial provision for future needs; coordinate waste handling and site development plans and maintenance requirements; obtain local and state permits; provide clean access to utility lines; fully staffed DOE Area Office including project manager; institutional controls; demolition of contaminated buildings and encapsulation of site to control contamination

St. Louis Downtown Site Vicinity Properties (SLDS)

Objective:	Total release of land for unrestricted use
Remediation Plan:	Dismantle contaminated buildings; exhumation of contaminated soil to standards; clean up groundwater as feasible; ensure no recontamination
Cleanup Level(s):	Clean up radioactive contamination to 5/15 picocuries per gram for radium and thorium, per DOE Order 5400.5, "Radiation Protection of the Public and the Environment"
Interim Measures:	Control surface soil; control incoming and outgoing migration of air/surface water/soil; maintain fencing and signs; ongoing public awareness and education programs
Long Term Management:	DOE maintain perpetual responsibility for subsequent discovery of nuclear weapons production-related waste; DOE maintain responsibility for subsequent discovery of contaminants and/or more stringent cleanup standards or other similar changes; compensation for damages and loss of use (in the past)

Riverfront Trail

Objective:	Release of land for **limited** use *e.g.*, access permitted for brief periods (recreation) or in controlled environment (factory, warehouse)
Remediation Plan:	Hotspot removal & protective cover; removal of contamination to standards suitable to user scenario; reduce contaminant concentration; ensure no recontamination
Cleanup Level(s):	Clean up to standards suitable for industrial, commercial and recreational uses
Interim Measures:	Control surface soil; control incoming and outgoing migration of air/surface water/soil; fencing and signs (immediately); ongoing public awareness and education programs
Long Term Management:	Public awareness and education programs (ongoing); monitoring: a) access to property and b) environmental conditions; prevention of soil migration; maintain flood control measures; provide clean access to utility lines; fully staffed DOE Area Office including project manager on site; obtain local and state permits; suitable aesthetics; institutional controls; DOE retains responsibility, liability (perpetual caretaker status); financial provision for future needs

Coldwater Creek

Objective:	Total release of creek and banks for unrestricted use
Remediation Plan:	Exhumation of contaminated soil and sediment and recontouring with clean fill; clean up groundwater to standards; ensure no recontamination
Cleanup Level(s):	In the areas where there is potential for movement of existing soils and sediments, the cleanup levels for radium and thorium will be 5 picocuries per gram to depth of potential creek flow
Interim Measures:	Address sources of radiological contamination; comprehensive monitoring of Coldwater Creek water to evaluate impact from other FUSRAP sites and influence of all aquifers; control incoming and outgoing migration of water and soil; fencing and signs (immediately) on both sides of creek; ongoing public awareness and education programs
Long Term Management:	DOE maintain perpetual responsibility for subsequent discovery of nuclear weapons production-related waste; DOE maintain responsibility for subsequent discovery of contaminants and/or more stringent cleanup standards or other similar changes; compensation for damages and loss of use (in the past)

St. Louis Airport Site (SLAPS)

Objective:	Total release of land for unrestricted use
Remediation Plan:	Exhumation and remote disposal of all contaminated material from upper and deep aquifer systems; recontour with clean fill; erosion and flood control; revegetation
Cleanup Level(s):	Clean up radioactive contamination to 5/15 picocuries per gram for radium and thorium, per DOE Order 5400.5, "Radiation Protection of the Public and the Environment"
Interim Measures:	Fully staffed DOE Area Office including project manager on site; reroute McDonnell Boulevard traffic during remediation; minimal site improvements to control erosion (to protect public and worker health)
Long Term Management:	DOE maintain perpetual responsibility for subsequent discovery of nuclear weapons production-related waste; DOE maintain responsibility for subsequent discovery of contaminants and/or more stringent cleanup standards or other similar changes; compensation for damages and loss of use (in the past)

Ballfields

Objective:	Total release of land for unrestricted use; unrestricted use of groundwater (*i.e.*, residential-gardener scenario)
Remediation Plan:	Exhumation of contaminated soil to standards; clean up groundwater to standards; ensure no recontamination
Cleanup Level(s):	Clean up radioactive contamination to 5/15 picocuries per gram for radium and thorium, per DOE Order 5400.5, "Radiation Protection of the Public and the Environment"
Interim Measures:	Control surface soil; control incoming and outgoing migration of air/water/soil; fencing and signs (immediately); ongoing public awareness and education programs
Long Term Management:	DOE maintain perpetual responsibility for subsequent discovery of nuclear weapons production-related waste; DOE maintain responsibility for subsequent discovery of contaminants and/or more stringent cleanup standards or other similar changes; compensation for damages and loss of use (in the past)

Latty Avenue Vicinity Properties

Objective:	Total release of land for unrestricted use
Remediation Plan:	Dismantle contaminated buildings; exhumation of contaminated soil to standards; clean up groundwater as feasible; ensure no recontamination
Cleanup Level(s):	Clean up radioactive contamination to 5/15 picocuries per gram for radium and thorium, per DOE Order 5400.5, "Radiation Protection of the Public and the Environment"
Interim Measures:	DOE provide documentation for field use showing locations of contamination; establish interim storage plan for handling contaminated material generated during remediation activities; provide support to utilities for routine and emergency activities in contaminated areas as necessary; provide suitable location for interim storage of contaminated soil
Long Term Management:	DOE maintain perpetual responsibility for subsequent discovery of nuclear weapons production-related waste; DOE maintain responsibility for subsequent discovery of contaminants and/or more stringent cleanup standards or other similar changes; compensation for damages and loss of use (in the past)

North County Haul Routes

Objective:	Total release of land for unrestricted use
Remediation Plan:	Dismantle contaminated buildings; exhumation of contaminated soil to standards; clean up groundwater as feasible; ensure no recontamination
Cleanup Level(s):	Clean up radioactive contamination to 5/15 picocuries per gram for radium and thorium, per DOE Order 5400.5, "Radiation Protection of the Public and the Environment"
Interim Measures:	DOE provide documentation for field use showing locations of contamination; establish interim storage plan for handling contaminated material generated during remediation activities; provide support to utilities for routine and emergency activities in contaminated areas as necessary; provide suitable location for interim storage of contaminated soil
Long Term Management:	DOE maintain perpetual responsibility for subsequent discovery of nuclear weapons production-related waste; DOE maintain responsibility for subsequent discovery of contaminants and/or more stringent cleanup standards or other similar changes; compensation for damages and loss of use (in the past)

Futura

Objective:	Total release of land for unrestricted use
Remediation Plan:	Exhumation of all contaminated soil, and groundwater; ensure no recontamination; recontour with clean fill; revegetation
Cleanup Level(s):	Clean up radioactive contamination to 5/15 picocuries per gram for radium and thorium, per DOE Order 5400.5, "Radiation Protection of the Public and the Environment"
Interim Measures:	Coordination and compensation for business interruption and/or relocation; implement remediation plan immediately; control surface soil; control incoming and outgoing migration of air/water/soil; fencing and signs (immediately); ongoing public awareness and education programs; flood control measures; expedite pump and treat of groundwater
Long Term Management:	DOE maintain perpetual responsibility for subsequent discovery of nuclear weapons production/related waste; DOE maintain responsibility for subsequent discovery of contaminants and/or more stringent cleanup standards or other similar changes; compensation for damages and loss of use (in the past)

Hazelwood Interim Storage Site (HISS)

Objective:	Total release of land for unrestricted use
Remediation Plan:	Exhumation of all contaminated soil, and groundwater; ensure no recontamination; recontour with clean fill; revegetation
Cleanup Level(s):	Clean up radioactive contamination to 5/15 picocuries per gram for radium and thorium, per DOE Order 5400.5, "Radiation Protection of the Public and the Environment"
Interim Measures:	Control surface soil; control incoming and outgoing migration of air/water/soil; fencing and signs (immediately); ongoing public awareness and education programs; flood control measures; expedite pump and treat of groundwater
Long Term Management:	DOE maintain perpetual responsibility for subsequent discovery of nuclear weapons production and related waste; DOE maintain responsibility for subsequent discovery of contaminants and/or more stringent cleanup standards or other similar changes; compensation for damages and loss of use (in the past)

West Lake Landfill

Objective:	Release of land for limited use
Remediation Plan:	Fully encapsulated cell
Cleanup Level(s):	Isolate contaminated material from surrounding soil
Interim Measures:	Contain air, water and soil migration; treat contaminated water; fencing and signs (immediately); ongoing public and employee awareness and education programs
Long Term Management:	Fence, signs; revegetate, maintain vegetation or cover; public awareness and education programs (ongoing); monitoring: a) access to property and b) environmental conditions, especially groundwater; prevention of migration (soil and surface water); flood control measures; fully staffed DOE Area Office including project manager on site; obtain local and state permits; suitable aesthetics; institutional controls; DOE retains responsibility, liability (perpetual caretaker status); financial provision for future needs

Remediation Options (Special) Working Group

The Task Force created a special Working Group to develop a formal list of cleanup alternatives for each of the component sites. The discussion was started with presentations by Dan Wall of the U.S. EPA and Elsa Steward and Mitch Scherzinger of the Missouri Department of Natural Resources concerning the perspective of the two regulatory agencies on the cleanup objectives.

Dan Wall described the process and values used by EPA to evaluate proposed remediation plans for properties on the National Priorities List (Superfund sites). He reviewed the nine CERCLA evaluation criteria with the group :

1. Overall protection of human health and the environment
2. Compliance with ARARs - Applicable or Relevant and Appropriate Requirements
3. Long-term effectiveness and permanence
4. Short-term effectiveness
5. Reduction of toxicity, mobility and volume
6. Implementability
7. Cost
8. State acceptance
9. Community acceptance

He also pointed out that any remediation plan must be protective of human health and the environment and must also balance cost and risk considerations.

Elsa Steward, Deputy Director, Division of Environmental Quality, Missouri Department of Natural Resources, outlined the state's guidelines for remediation of the St. Louis Site:

1. Groundwater must be remediated and measures taken to ensure that there is no further deterioration of groundwater quality. Interim actions to remove contaminants from groundwater may be acceptable as temporary measures.
2. Owners of contaminated property should not have to be responsible for cleanup costs or for negative economic impact resulting from contamination.
3. The overall objective is to protect human health and the environment.
4. Exhumation of contaminated material and off-site disposal is the preferred method of remediation.
5. On-site storage in a properly engineered (RCRA Subtitle C standards) and monitored cell is a possibility, but is not preferred.

She also noted that EPA and DOE criteria do not necessarily constrain or determine the Task Force's recommendations.

To facilitate discussions on the appropriate cleanup strategies for each of the sites, the Working Group classified the cleanup options as outlined below.

OPTION	CORRESPONDING ACTIONS
I	**No action** – Maintain existing conditions
II	**Controlled, restricted access to property**; deed restrictions for limited use Apply institutional controls and monitoring
III	**Release of land for limited use as industrial/commercial/recreational** Hot spot removal and installation of a protective cover. Cleanup standards should be appropriate for specific end use. Ensure no recontamination.
IV	**Release of land for unrestricted use – "free of radiological restrictions"** Exhumation and removal of all contaminated soils to a licensed commercial facility. Cleanup standards: Removal of all contaminated material exceeding 5 picocuries per gram (5 pCi/g) above background levels in the top 15 cm (6 inches) of soil, and 15 picocuries per gram (15 pCi/g) in each 15 cm layer below the top layer. Ensure no recontamination.

Cost, risk, groundwater considerations and other issues were integrated into the selection of preferred remediation options.

Highlighted below are comments from several of the meeting participants –
Anna Ginsburg reported that the objective of the City of St. Louis and the St. Louis Airport Authority is to achieve complete remediation of both SLAPS and the Ballfields to conditions that would allow total release of the land for unrestricted use (Option IV).

Jack Frauenhoffer proposed that the Mallinckrodt plant site (SLDS) be remediated to standards that would be protective of human health and would allow continued use of the property for industrial purposes (Option III). He also proposed that the Riverfront Trail area be remediated to standards suitable for recreational use (Option III) and that the SLDS Vicinity Properties be remediated to Option IV standards due to their accessibility to the general public and the modest volume of contaminated material.

Peggy Hermes, speaking for the Missouri Coalition for the Environment, would support an Option III cleanup for Mallinckrodt, the Riverfront Trail and West Lake Landfill and Option IV for the entire length of Coldwater Creek and for all of the other component sites.

A polling of the group participants indicated a strong preference for Options III and IV – little or no support was expressed for Options I or II.

Option IV Remediation	Option III Remediation
SLAPS	Mallinckrodt Plant (SLDS)
SLAPS Vicinity Properties	Riverfront Trail
HISS	West Lake Landfill
SLDS Vicinity Properties	Lower portion of Coldwater Creek
Ballfields	
Upper portion of Coldwater Creek	

At the July 23, 1996 Task Force meeting it was decided that the entire length of Coldwater Creek should be cleaned to Option IV level. The Task Force also asked DOE to exercise special care when excavating the lower end of the creek in order to preserve the integrity of the natural habitat.

Members participating in this group included:

Dave Adler, DOE
Barbara Cooper, Office of Congressman Talent
Sally Price, County Commission
Kay Drey, County Commission
Conn Roden, County Commission
Jack Frauenhoffer, City Commission
Anna Ginsburg, City Commission
Lou Jearls, City of Florissant
Tom Binz, Laclede Gas Company
Dan Wall, EPA
Donovan Larson, St. Louis County Water
Bob Marchant, St. Louis Metropolitan Sewer District
Roger Pryor, Missouri Coalition for the Environment
Peggy Hermes, Missouri Coalition for the Environment
Mitch Scherzinger, Missouri Department of Natural Resources
Elsa Steward, Missouri Department of Natural Resources
Jan Titus, St. Louis Lambert Airport
Jim Grant, Mallinckrodt
Doug Eller, Grace Hill Neighborhood Association/Riverfront Trail

TECHNOLOGIES WORKING GROUP

The Technologies Working Group was formed in July 1995 to screen known technologies and recommend to the Task Force those technologies that might have potential application for the St. Louis FUSRAP site.

The Oak Ridge National Laboratory Technology Logic Diagram and associated database (developed for the Office of Technology Development, Department of Energy, September 1993) were used to identify and review potential technologies to reduce volume and immobilize the radionuclides. Size separation, density separation and attrition scrubbing were immediately eliminated as possible remediation alternatives because of St. Louis County soil characteristics.

Soil washing and chemical extraction were identified as technologies for further investigation. Bench scale testing revealed that a single stage extraction process at elevated temperatures was acceptable for removing 95-97% of U-238. However, removal of Th-230 and Ra-226 required multiple extractions (3-5) to achieve acceptable concentration levels. Additional laboratory investigations would be required to design and assess the economics of the downstream processes -- dewatering of extraction slurry, recovery and recycle of the extraction reagents, and concentration of the radionuclide residual stream and other process waste streams -- which are costly and time-intensive activities.

Several other technologies, not in the database, were reviewed -- ex-situ microwave vitrification (treatment process) coupled with gamma ray spectroscopy, laser ablation nebulization spectroscopy (characterization technology) in a continuous field process -- and identified as having promise for cleaning up the St. Louis FUSRAP Site. The group also discussed the use of barrier technology to prevent contamination of underground and surface water. It was agreed that a recommendation be forwarded to DOE to further evaluate these technologies in a field demonstration.

It was also decided that physical soil washing should be evaluated for use at the downtown site.

In addition, the Working Group developed a list of characteristics to be used when evaluating any applicable technologies for the St. Louis FUSRAP Site.

1. Volume reduction either through treatment of soils and/or through use of analytical tools to minimize materials for disposal or treatment
2. Stability of final waste
3. Management of groundwater and surface water
4. Control of contaminated emissions -- air and water
5. Engineering controls -- temporary enclosures, frozen barriers
6. Cost effectiveness

Members participating in this group included:

Tom Binz, Laclede Gas Company
Kay Drey, County Commission
Sally Price, County Commission
Bob Geller, Missouri Department of Natural Resources
Mitch Scherzinger, Missouri Department of Natural Resources
Dan Wall, EPA
Jim Grant, Mallinckrodt
Bob Wester, R.M. Wester & Associates
Clarence Styron, R.M. Wester & Associates
Laurie Peterfreund, National Center of Environmental Information and Technology

COMMUNICATIONS WORKING GROUP

The Communications Working Group was formed in July 1995 to develop a strategy to increase public awareness about the St. Louis Site Remediation Task Force and to encourage participation in the process.

The group met on seven occasions and produced the following list of activities and tools for information dissemination:

1. Task Force letterhead
2. General information sheet
3. Standardized meeting notices
4. Standardized format for summary highlights of Task Force Meetings
5. Media distribution list
6. General mailing list
7. Media strategy
8. Standardized press release format
9. Proposed public meeting plan
10. Proposed distribution plan for draft and final versions of Task Force Report and Recommendations

Draft documents were presented to the Task Force for review and comment in September 1995.

In November 1995 the Task Force considered and approved a proposed communication plan for:

1. mailing information to stakeholders and media on a monthly basis
2. producing and distributing special issue fact sheets
3. conducting routine publicity activities, such as notices and summary highlights.

In December 1995 the Task Force approved the proposed public meeting plan for public input into the Task Force report and recommendations.

Members participating in this group included:

Jack Frauenhoffer, City Commission
Nancy Lubiewski, County Commission
Sally Price, County Commission
Jean Montgomery, Berkeley

MEMBERSHIP WORKING GROUP

It was understood from the outset of the process that the effectiveness of the Task Force and the authority of its recommendations to DOE were dependent on the quality of stakeholder representation and participation.

In October 1995 it was agreed that a Membership Working Group would be formed to review the roster of participants and to identify potential additions to the list of stakeholders. This new group met for the first time on November 7, 1995 and identified seven stakeholders that should be asked to participate on the Task Force – McDonnell Douglas, U.S. Army Corps of Engineers, City of Bridgeton, Southwestern Bell Telephone, St. Louis Metropolitan Sewer District, City of Florissant, and City of Black Jack. That list was presented to the Task Force and it was agreed that invitations would be extended to all seven. Invitations were extended on November 16, 1995 and follow-up calls were made to each invitee. Of the seven, three agreed to be on the Task Force – City of Florissant, City of Bridgeton and the St. Louis Metropolitan Sewer District. Southwestern Bell Telephone, U.S. Army Corps of Engineers and the City of Black Jack declined the invitation but asked to be included on the Task Force mailing list.

It also was agreed that the cities of Berkeley and Hazelwood would each be represented by two voting participants, the mayor and one other to be named by each city.

Each new participant was provided with background information, including a complete set of key documents, and was offered the opportunity of an orientation session.

Members participating in this group included:

Kay Drey, County Commission
Sally Price, County Commission

Section 2. COLDWATER CREEK PANEL

In summer 1995, it was determined that critical issues concerning the impact of radioactive contaminants at the St. Louis Airport Site (SLAPS) on groundwater and surface water must be addressed to enable the Task Force to continue its work. A panel of geologists and hydrogeologists was assembled to review existing data, to identify any additional information required to complete its assignment and to report its observations, conclusions and recommendations regarding current and likely future conditions at the site.

A list of qualified and available candidates was developed by SAIC, a DOE contractor, and presented to the Priorities Working Group for approval:

David W. Miller, Chairman	Geraghty & Miller, Inc.
John D. Rockaway, Ph.D.	University of Missouri - Rolla Department of Geological and Petroleum Engineering
Thomas Aley	Ozark Underground Laboratory, Inc.
James Cox	Walsh Environmental Scientists and Engineers, Inc.,
Mimi R. Garstang, P.G.	Missouri Department of Natural Resources Division of Geology and Land Survey
Angel Martin	U.S. Geological Survey

The panel, known formally as the St. Louis Site Expert Geohydrological Panel, held its first meeting in St. Louis on September 15, 1995.

St. Louis Site Expert Geohydrologic Panel – Key Issues

The St. Louis Site Expert Geohydrologic Panel was asked to review existing information regarding geology, hydrogeology, surface water hydrology and contaminant transport for the St. Louis Airport site. They were asked to address the following questions:

1. Is shallow groundwater contamination at the St. Louis Airport Site having, or expected to have, any environmentally significant impact on water or sediment quality in Coldwater Creek?

2. Is surface water runoff from the St. Louis Airport Site having, or expected to have, any environmentally significant impact on water or sediment quality in Coldwater Creek?

3. Is contamination present at the St. Louis Airport Site expected to have any environmentally significant impact on the "deep" bedrock groundwater within the foreseeable future, i.e., the next 100 years?

The initial meeting was devoted to a briefing by SAIC on the following topics:

- Site history and timeline
- Surface and subsurface distribution of radionuclides
- Nature of the material deposited at the site
- Regional and local geology
- Water resources
- Land use patterns
- Earthquake analysis
- Hydrologic pathways of radionuclide transport
- Stratigraphy underlying the site
- Groundwater modeling data
- Soil loss estimates
- Well monitoring data
- Sampling results
- Estimates of radionuclide loading to Coldwater Creek by surface and groundwater pathways

A second meeting was held on October 15, 1995 to review additional technical information regarding the site and to answer questions from the panelists regarding the previous presentation. At the third and final meeting on December 13, 1995 SAIC presented data concerning dose and risk assessments and the results of a flow and transport modeling study for the SLAPS groundwater system.

The panel reported that, while there did not appear to be any imminent threat of consequence to either the groundwater beneath the site or to Coldwater Creek from contaminants buried at the site, there was ongoing migration of contaminants via surface water runoff, which impacts Coldwater Creek and downstream properties. After reviewing available data and the modeling study the panel concluded that:

- Radionuclides are present in shallow groundwater at SLAPS. Modeling indicates there will continue to be off-site migration of contaminants through the upper groundwater system toward Coldwater Creek.
- Radionuclides from SLAPS have impacted sediment quality in the stream channel and banks of Coldwater Creek. This was caused by both stream bank erosion and sheet and gully erosion across the site. Stormwater flow and flooding along Coldwater Creek also have resulted in periods of accelerated erosional activity.
- Modeling studies indicate that the presence of radionuclides in the soil and upper aquifer system will not have a significant impact on the bedrock aquifer within the foreseeable future (100 years). The deep ground water system has not been sufficiently characterized; however, *characterization could change the conclusions* drawn from the modeling studies.
- The site is underlain by hydrogeological features that do not meet criteria for a storage or disposal facility for radioactive wastes. Such features include a shallow water table, a flood-plain setting, the absence of a continuous confining layer, the unknown bedrock conditions and the accessibility of the site to the public.

Additional data will be required to develop a more complete hydrogeological assessment of the deep groundwater system and a more comprehensive analysis of contaminated sources. This information is considered critical for a more thorough assessment of potential off-site contamination and to verify the results of the groundwater modeling. Listed below are the issues related to data gaps that were identified.

- Little is known about the areal extent of or thickness of the potential clay-rich unit that may serve as a barrier to groundwater movement beneath the site.
- True separation of the groundwater above and below the potential unit is unknown. Aquifer tests were not conclusive.
- Historically, wells within a three-mile radius of SLAPS have produced drinking water from the upper bedrock aquifer. A current door-to-door survey to document present day groundwater use is needed to identify users at risk.
- The true relationship between the creek and shallow groundwater is unknown.
- Vertical flow gradients indicated by monitoring wells are inconclusive. It is important to understand where steep vertical gradients truly exist to identify where shallow contamination may more readily move to depth.
- The vertical extent of groundwater is unknown beneath the middle portion of SLAPS. Detailed data to simulate the groundwater model are not available.
- One bedrock well completed in the coal and shale unit at the site sporadically shows elevated radionuclide levels. It needs to be determined whether this is a natural phenomenon or if this is an indication that radionuclides are moving downward.
- Characterization of the materials and groundwater flow below 50 feet is poor.
- The nature and distribution of both organic (TCE, DCE, and toluene) and inorganic chemicals are needed to better understand the hydraulic relationship between the various geologic units and their potential to enhance the migration of radionuclides.

The panel's findings were presented to the Task Force on January 13, 1996, followed by a draft written report dated February 15, 1996. The final report of the panel was distributed to the Task Force in mid-April 1996.

Mimi Garstang, Deputy Division Director of Missouri's Department of Natural Resources - Division of Geology and Land Survey, and Angel Martin, Chief, Investigations Section of the U.S. Geologic Survey (both members of the Panel) prepared addendum reports to provide more detailed examples and documentation of concern over potentially premature conclusions made in the panel's report. (Report dated April 22, 1996)

FINAL REPORT
ST. LOUIS AIRPORT SITE
EXPERT GEOHYDROLOGIC PANEL
FEBRUARY 15, 1996

Prepared for

St. Louis Area Task Force

Prepared by

The St. Louis Airport Site
Expert Geohydrologic Panel

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FINAL REPORT
ST. LOUIS AIRPORT SITE
EXPERT GEOHYDROLOGIC PANEL
FEBRUARY 15, 1996

INTRODUCTION

An Expert Geohydrologic Panel was established by the St. Louis Area Task Force in late 1995 to review pertinent site information regarding hydrogeology, surface-water hydrology, and contaminant transport at the St. Louis Airport site. This report describes the results of that review. The first meeting of the panel was on September 15, 1995, and preliminary results of the panel's review were provided in an oral presentation to the St. Louis Area Task Force on January 16, 1996. The St. Louis Area Task Force is a citizens' group created to evaluate the options available for remediation of the sites in the St. Louis area that are contaminated with low-level radioactive waste. These locations include the Mallinckrodt Plant, the Hazelwood Interim Storage Site, the St. Louis Airport Site (SLAPS), and various vicinity properties.

The panel consisted of the following members:

Mr. David W. Miller (Chairman),	Geraghty & Miller, Inc.
Dr. John D. Rockaway,	University of Missouri
Mr. Thomas Aley,	Ozark Underground Laboratory Inc.
Mr. James Cox,	Walsh Environmental Scientists and Engineers, Inc.
Ms. Mimi Garstang,	Missouri Department of Natural Resources
Mr. Angel Martin, Jr.,	U.S. Geological Survey

The first four members listed above are professionally representing only themselves in a private capacity with regard to the various issues. Mr. Angel Martin, Jr., as an employee of the U.S. Geological Survey (USGS), can comment on the technical aspects of the work. The USGS cannot make any recommendations regarding remediation of the site or alternatives or recommendations for the possible closure of the site. Also, the USGS will not comment on criteria for the disposal of additional contaminated soil and debris and the nature of immediate or long-term actions and site modifications.

Ms. Garstang, who is employed by the Missouri Department of Natural Resources as Deputy Division Director, has provided the Task Force with a separate report.

The questions provided to the panel for their analysis were as follows:

1. Is shallow groundwater contamination at the St. Louis Airport Site having, or expected to have, any environmentally significant impact on water or sediment quality in Coldwater Creek?

2. Is surface water runoff from the St. Louis Airport Site having, or expected to have, any environmentally significant impact on water or sediment quality in Coldwater Creek?

3. Is contamination present at the St. Louis Airport Site expected to have any environmental significant impact on the "deep" bedrock groundwater within the foreseeable future (e.g., next 100 years)?

The charge given to the panel was to restrict its review to the analysis of geologic and hydrologic issues related to SLAPS. These issues represent only some of the many factors that are typically considered with regard to decisions on future activities at Superfund sites.

During its deliberations, the panel also developed opinions on the following issues:

1. Adequacy of available data on which to base future decisions on potential risk.

2. Suitability of the site for disposal of additional wastes contaminated at low levels of radioactivity.

3. Immediate activities that might be considered for increased monitoring and for minimizing potential environmental impacts.

BACKGROUND

The SLAPS is a 21.7 acre property adjacent to the Lambert-St. Louis International Airport. The property is bounded to the west by Coldwater Creek, to the south by the Norfolk and Western Railroad and to the north and east by McDonnell boulevard. From 1946 to 1966, residues from the processing and production of various forms of uranium compounds were placed in the area. In the mid 1960's an unknown quantity of the residues were removed from the property and the entire property was covered with up to 3 feet of clean fill. Additional fill and rubble were placed at the site in

the 1970's and a gabion wall was constructed to minimize erosion by Coldwater Creek. Stormwater runoff from the SLAPS property presently flows in surface ditches and a pipe that all drain to Coldwater Creek. The property is fenced and is environmentally monitored and routinely maintained.

Radioactive contamination of soil at SLAPS has been characterized and extends to a depth of about 18 feet, with the majority of contamination between 4 and 8 feet below land surface (bls). Levels of uranium-238, radium-226, thorium-230, and thorium-232 in soil samples from these depths exceed background levels. Results of groundwater analyses in some monitoring wells, stormwater, and Coldwater Creek sediment also indicate elevated uranium levels. However, measured levels of radionuclides in surface water from Coldwater Creek were consistent with background levels and lower than proposed Department of Energy (DOE) guidelines.

The results of sampling and monitoring at SLAPS are summarized in numerous reports on the property. In addition, a current environmental program at SLAPS involves obtaining samples on a semi-annual basis for air, surface water, sediment, groundwater, and stormwater. The most recent sampling results, based on 10 monitoring wells, 8 surface-water sites, and two stormwater discharge points appear to be consistent with earlier investigations at SLAPS.

In the various investigations carried out at SLAPS, the geologic formations underlying the site have been divided into upper and lower aquifer systems, which are separated by confining unit composed of dense clay. The confining unit is greater than 25 feet thick along the western portion of the property, thins in an easterly direction, and pinches out near the eastern edge of SLAPS. The upper aquifer system consists of about 30 feet of clayey silt, fine sands, and silty clays. The lower aquifer system includes an unconsolidated unit of mostly silty clay and clayey gravel, up to 30 feet thick, and the underlying bedrock. The bedrock beneath the western portion of SLAPS consists of limestone. Shale overlies the limestone along the eastern portion of the site. Depth to bedrock ranges from 55 feet on the east side of SLAPS to a maximum of 90 feet toward Coldwater Creek.

PROCEDURES

To address the issues, the panel members reviewed the data, analyzed the conclusions drawn from previous DOE investigations and participated in a series of meetings focused on reviewing the available site data. At these meetings, presentations were made by the technical personnel who had

been associated with previous and ongoing studies. Requests from the panel members for supplementary information, explanation of assumptions or processes and further analysis of available data were submitted to the appropriate technical personnel. The responses to these requests were included as part of the panel review process.

The panel members independently evaluated the data and reports provided and developed preliminary conclusions. Subsequently, the panel met as a group to identify those conclusions upon which a general concurrence was made and outlined the concepts upon which this report is based.

The panel especially wants to thanks David S. Miller of Science Applications International Corporation for his efforts in providing background information on the site to the panel and in responding to the panel's many requests for additional data and analyses. Mr. Miller and the other DOE contractors involved in this process greatly simplified the panel's review through their thorough and timely presentations.

ANALYSIS

A number of factors were considered to be of major importance in supporting the conclusions and recommendations of the panel's review. These factors included:

1. Radionuclides are present in groundwater at SLAPS with higher activity levels identified near Coldwater Creek. Groundwater movement is a potential avenue for direct discharge of radionuclides to Coldwater Creek.

2. Groundwater monitoring has shown the migration of radionuclides in the direction of groundwater flow across from McDonnell Boulevard and under the formerly used ballfields property to the north. Low levels of radionuclides are present in at least one monitoring well adjacent to Coldwater Creek in the ballfields area. This factor raises concern over potential shallow discharge of radionuclides to Coldwater Creek to the west and the north, and potential vertical migration to the lower aquifer system.

3. Soil contaminated with radionuclides is present below the water table.. Therefore, groundwater is in contact with a source of radionuclides.

4. Significant levels of radionuclides are present in the soil at very shallow depths, less than 0.5 foot bls along McDonnell Boulevard on the northern boundary of SLAPS and the railroad tracks along the southern boundary. Much of the area is easily accessed by the public.

5. Coldwater Creek sediments containing radionuclides extend downstream from the site. Although this condition may have resulted from historic erosion at the SLAPS before the present gabion wall was constructed, it may also be indicative of contaminated stormwater discharging from the present SLAPS drainage system. As late as the fourth quarter of 1994, one stormwater sample collected at SLAPS exceeded the DOE reference value of "Radiation Protection of the Public and the Environment."

6. Volatile organic chemicals have been found in groundwater at SLAPS. These are not only serious environmental contaminants; they can provide the potential for facilitating transport of less mobile chemicals through the groundwater system.

7. Total carcinogenic risks from radionuclide exposure at SLAPS, as estimated in the baseline risk assessment prepared by Argonne National Laboratory in 1993, were 9.4×10^{-5}, 1.1×10^{-3}, and 1.1×10^{-1} for a SLAPS trespasser, maintenance worker, and future resident, respectively. Although these are relatively high values, the report points out that conservative, worst case scenarios were assumed in arriving at these estimates, especially with regard to future land use.

In its evaluation of data the panel also took into account some very important characteristics of the SLAPS that are favorable in the potential to minimize adverse effects to the creek and groundwater. Most important of these is the fine-grained nature of the unconsolidated sediments underlying the area. These deposits overlie the lower aquifer system. Horizontal and vertical flow of groundwater through fine-grained sediments is slow, and the potential rate of discharge of groundwater to Coldwater Creek is low. In addition, radionuclides typically have low mobility in groundwater. The fine-grained nature of the geologic units would indicate a high potential for adsorption, further limiting the migration of radionuclides. Available water-quality data indicate the lack of a widespread plume of heavily contaminated groundwater after 50 years of the presence of the source. In addition, surface-water monitoring of Coldwater Creek has consistently shown radionuclide values both within DOE guidelines and below background levels. Finally, there is no groundwater in use in the immediate area, which would affect natural groundwater flow.

Because the issues raised by the St. Louis Task Force involved future impacts, the panel relied heavily in its deliberations on a groundwater modeling study carried out by the DOE contractors. During several meetings with the contractors, the model parameters were reviewed and suggestions were made for modification of some of the parameters. The panel also recommended the expansion of the model to provide a more complete picture of potential migrations of radionuclides to Coldwater Creek and to the lower aquifer system. The results of the modeling support the assumed very slow movement of the contaminants in groundwater. Also, little environmental impact on Coldwater Creek was simulated in the model, well beyond the 100-year time period the panel was asked to consider. The model indicates that most groundwater flow is above the primary low permeability clay confining unit, and that vertical migration into the lower aquifer system would not be significant for more than 100 years.

The panel concluded that the three-dimensional groundwater flow model completed to this point was technically sound, and the hydrologic units underlying the site were simulated reasonably with the available data. The calibration results based on simulating measured water levels, especially in the upper aquifer system were acceptable. However, model calibration was completed with only a limited data set especially for the lower aquifer system. The stratigraphy underlying SLAPS has not been fully characterized, and significant gaps in various data sets are present. For example, the extent and thickness of the clay confining layer across the site is not known. This unit restricts vertical flow between the upper and lower aquifer systems and, therefore, the possible movement of contamination. This is important in defining the hydrology and possible movement of contamination.

The hydrology of the limestone and shale is not fully understood because of the lack of wells open to the bedrock at the site. The flow model has not been verified in that the model has not been run with an independent set of data. This should be done so that the model can be utilized with confidence in the simulation of the distribution of activity of radioactive constituents underlying the site. Comparison of streamflow in Coldwater Creek with simulated groundwater discharge to the creek is recommended in future calibrations.

CONCLUSIONS

As a result of the review of available data, analysis drawn from previous DOE investigations, and the modeling studies, the panel has developed a number of conclusions regarding present levels,

distribution and effect of contamination at the site as well as conclusions regarding projected levels and distribution of contamination in the future (100 years).

1. Radionuclides already are present in shallow groundwater at SLAPS, and the results of the groundwater modeling study indicate that there will continue to be off-site migration of contaminants through the upper groundwater system toward Coldwater Creek. However, results of the groundwater modeling also indicate that the levels of contamination that might eventually reach the creek would not impact surface water or sediments so that DOE guidelines would be exceeded for at least 100 years. The model results are consistent with available water quality data.

2. The presence of radionuclides at the SLAPS has impacted sediment quality in Coldwater Creek. Sediment quality has been impacted as a result of both stream bank erosion adjacent to the SLAPS and from sheet and gully erosion across the site. Stormwater flow and flooding along Coldwater Creek has resulted in periods of accelerated erosional activity. Contaminant migration from soil erosion appears to have been more significant in the past. Current rates of erosion have been reduced from previous levels as a result of the natural re-establishment of vegetation over parts of the site and the construction of a gabion wall to control bank erosion along Coldwater Creek. Neither of these features has completely eliminated the contribution of radionuclides into the surface waters of Coldwater Creek. Although the impact of these sources is not acute at this time, it does present a chronic problem to environmental quality along Coldwater Creek and should be corrected.

3. Results of the groundwater modeling study indicate that the presence of radionuclides in the soil and upper aquifer system at SLAPS will not have a significant impact on the lower aquifer system within the foreseeable future (100 years). However, the panel concluded that the deep groundwater system has not yet been sufficiently characterized, and that both the model and the conclusions drawn from the model will require verification as additional data become available.

4. The site is underlain by hydrogeological features that do not meet criteria for the location of a storage or disposal facility for radionuclide wastes. Given that the wastes are already present, it nevertheless is the conclusion of the panel that the site should not be used for the disposal of additional contaminated soil or other waste products. Physical, geological, and hydrological

aspects of the site that do not meet present criteria for disposal of wastes include a shallow water table, a flood-plain setting, the absence of a continuous and relatively thick confining layer, the presence of limestone that may be karstic in nature, and finally, the accessibility of the site. It should be noted that the model and risk assessment assumed no additional waste material would be placed at the site.

IMMEDIATE ACTIONS

Although the results of previous studies indicate that the impact of radionuclide contamination from the SLAPS into Coldwater Creek and the deep groundwater system is not acute at this time, there are a number of actions that the panel believes should be implemented immediately. These actions would be designed both to mitigate the present situation and to facilitate future investigations of contaminant migration and remedial action studies.

SITE MODIFICATIONS

The actions suggested do not represent a conclusion from the panel with respect to a recommended level or method of remediation, but are actions the panel feels could be implemented to reduce the off-site migration of radionuclide contamination from the present site.

1. The gabion wall which was constructed to prevent sediment erosion along the western creek bank appears to be accomplishing this purpose based on a cursory visual observation. However, the proximity of the radioactive contamination to the creek and the presence of contaminated material within the flood plain and the stormwater runoff ditches and pipe provide a rapid pathway for potential contaminant migration into the creek. There continues to be direct discharge of impacted material into the creek as indicated by the water-quality samples collected from one on-site stormwater- sampling site. Therefore, at a minimum, a site drainage control and prevention program should be designed and implemented to eliminate discharge of contaminated stormwater to Coldwater Creek.

2. The need for additional flood-protection facilities should be evaluated in order to maximize protection of the site from erosion during periods of flooding along Coldwater Creek.

3. The shallow soils contaminated with radionuclides found along McDonnell Road and the railroad right-of-way should be considered for removal as part of the ongoing remediation activities.

ADDITIONAL DATA ACQUISITION

The panel concluded that additional data will be required to develop a more complete hydrogeological assessment of the deep groundwater system and a more comprehensive analysis of contaminant sources. This information is considered necessary to more thoroughly assess potential off-site contamination and to verify the results of groundwater modeling.

1. Two deep monitoring wells should be installed that extend into the limestone bedrock. These wells should be designed to provide additional information on the deeper subsurface stratigraphy and the hydrologic continuity between the geologic units included within the lower aquifer system. They should be included in the ground-water monitoring program.

2. Consideration should be given to installation of a well of large enough diameter so that it could yield enough water to stress the lower aquifer system. A controlled aquifer test would provide data that could be used to better characterize the various aquifer systems and the confining unit.

3. Continuously recording stream gages should be installed upstream and downstream of the site. These would be useful in providing data for model simulation and determination of flow characteristics in Coldwater Creek.

4. Additional information should be acquired on the levels and types of groundwater contamination in the central region of the site. In this area, high concentrations of contaminants are present in the soil, yet data on the underlying groundwater quality are limited and the extent of contamination is poorly defined.

5. Additional information should be obtained on the nature and distribution of inorganic chemicals at the site. These data would be useful in helping to understand the hydraulic relation among the various geologic units.

LONG-RANGE PLANNING

The panel suggests that a comprehensive long-range program be established for the implementation of future hydrogeologic assessment studies at the site. To date, the continuity of monitoring has been interrupted from time to time. Data collection and analysis should address surface and groundwater quality, erosion, sedimentation and contaminant migration through and from the site. For example, additional wells on the ballfields property adjacent to Coldwater Creek should be included in future sampling. The data-collection program should be designed to provide the information necessary for groundwater modeling and risk assessment studies that will provide the basis for future decisions regarding the most appropriate remedial actions to be implemented at SLAPS and other sites in the St. Louis area.

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March 18, 1996

Mr. Jim Dwyer
Facilitator, St. Louis Area Task Force
4515 Maryland Avenue
St. Louis, MO 63108

Dear Mr. Dwyer:

I appreciated the opportunity to serve as a member of the Expert Geohydrologic Panel chosen to evaluate the potential groundwater and surface water impacts from the contamination associated with the St. Louis Airport Site (SLAPS). As a geologist working for the Missouri Department of Natural Resources (MDNR), Division of Geology and Land Survey (DGLS); I have worked on this site since the late 1980's. My office has been involved with the site since the 1960's. I am very familiar with the site characterization, site conditions and past site investigations.

I am submitting a report separate from the majority of the geohydrologic panel members. I regret that my comments were not able to be included in the panel's original draft. I believe that it is vitally important to provide the St. Louis Area Task Force with a clear outline of what information is agreed to by the panel; what information is questionable and why; and what additional information will allow for better technical decisions to be made regarding the site. I believe the St. Louis Area Task Force needs specifics to support the conclusions and recommendations as stated so that they can formulate their final recommendation for the site as well informed as possible.

It is important to note that the conclusions in both my report and the panel's final report are basically the same. The three questions that were asked of the panel are essentially responded to in the same manner. However, additional background information, data documentation, and specific information supporting the final conclusions has been provided in my report. I have outlined the specific differences in geohydrological conditions from the eastern to western ends of the site. Also, a

separate section on inconclusive data and data inadequacies has been prepared. It is my intent that the St. Louis Area Task Force will fully understand where conclusions have been formulated or where the data is still inconclusive at this point and conclusions may be only implied at this time.

If you have any questions, please feel free to call.

Sincerely,

DIVISION OF GEOLOGY AND LAND SURVEY

Mimi R. Garstang, P.G.
Deputy Division Director

MRG/dsb

FINAL REPORT
ST. LOUIS AIRPORT SITE
EXPERT GEOHYDROLOGIC PANEL
March 12, 1996

Report
Prepared for
St. Louis Area Task Force

Addendum Report
Prepared by
Mimi Garstang, member of the
The St. Louis Airport Site
Expert Geohydrologic Panel

FINAL REPORT
ST. LOUIS AIRPORT SITE
EXPERT GEOHYDROLOGIC PANEL
March 12, 1996

INTRODUCTION

An Expert Geohydrologic Panel was established by the St. Louis Area Task Force in late 1995 to review pertinent site information regarding geology, hydrogeology, surface water hydrology, and contaminant transport at the St. Louis Airport Site. This report describes the results of that review. The first meeting of the panel was on September 15, 1995, and preliminary results of the panel's review were provided in an oral presentation to the St. Louis Area Task Force on January 16, 1996. The St. Louis Area Task Force is a citizen's group created to evaluate the options available for remediation of the sites in the St. Louis area that are contaminated with low-level radioactive waste. These locations include the Mallinckrodt plant, the Hazelwood Interim Storage Site, the St. Louis Airport site (SLAPS) and various vicinity properties.

The panel consisted of the following members:

Mr. David W. Miller (Chairman,) Geraghty & Miller, Inc.
Dr. John D. Rockaway, University of Missouri
Mr. Thomas Aley, Ozark Underground Laboratory Inc.
Mr. James Cox, Walsh Environmental Scientists and Engineers, Inc.
Ms. Mimi Garstang, Missouri Department of Natural Resources
Mr. Angel Martin, Jr., U.S. Geological Survey

The first four members listed above are professionally representing only themselves in a private capacity with regard to the various issues. Mr. Angel Martin, Jr., as an employee of the U.S. Geological Survey (USGS), can comment on the technical aspects of the work. The USGS cannot make any recommendations regarding remediation of the site or alternatives or recommendations for the possible closure of the site. Also, the USGS will not comment on criteria for the disposal of additional contaminated soil and debris and the nature of immediate or long-term actions and site modifications.

Ms. Mimi Garstang, currently is employed by the Missouri Department of Natural Resources, Division of Geology and Land Survey (MDNR/DGLS), as Deputy Division Director. Working as a geologist for the department since 1978, her participation of the panel also provided a historical perspective on many of the technical investigations and documents.

The questions provided to the panel for their analysis were as follows:

1. In shallow groundwater contamination at the St. Louis Airport Site having, or expected to have, any environmentally significant impact on water or sediment quality in Coldwater Creek?

2. Is surface water runoff from the St. Louis Airport Site having, or expected to have, any environmentally significant impact on water or sediment quality in Coldwater Creek?

3. Is contamination present at the St. Louis Airport Site expected to have any environmental significant impact on the "deep" bedrock groundwater within the foreseeable future (e.g., next 100 years)?

The charge given to the panel was to restrict its review to the analysis of geologic and hydrologic issues related to SLAPS. These issues represent only some of the many factors that are typically considered with regard to decisions on future activities at Superfund sites.

1. Adequacy of available data on which to base future decisions on risk.

2. Suitability of the site for disposal of additional wastes contaminated with low-level radioactivity.

3. Immediate activities that might be considered for increased monitoring and for minimizing potential environmental impacts.

BACKGROUND

The SLAPS is a 21.7-acre property adjacent to the Lambert-St. Louis International Airport. The property is bounded to the west by Coldwater Creek, to the south by the Norfolk and Western Railroad and to the north and east by McDonnell Boulevard. From 1946 to 1966, residues from the processing and production of various forms of uranium compounds were placed in the area. In the mid 1960's an unknown quantity of the residues were removed from the property and the entire property was covered with up to 3 feet of clean fill. Additional fill and rubble were placed at the site in the 1970's and in the late 1980's a gabion wall was constructed to minimize erosion by Coldwater Creek. Stormwater runoff is presently uncontrolled. Surface ditches and a pipe all drain in the site directly into Coldwater Creek. The property is fenced and is subject to environmental monitoring and routine maintenance.

Radioactive contamination of soil at SLAPS has been characterized and extends to a depth of about 18 feet, with the majority of contamination between 4 and 8 feet below land surface (bls). Levels of uranium-238, radium-226, thorium-230, and thorium-232 in soil samples from these depths significantly exceed background levels. Analytical results of groundwater samples from some monitoring wells, stormwater samples, and sediment samples from Coldwater Creek also indicate elevated uranium levels. However, measured levels of radionuclides in surface water from Coldwater Creek were consistent with background levels and lower than proposed Department of Energy (DOE) clean-up guidelines. The results of sampling and monitoring at SLAPS are summarized in numerous reports on the property as referenced in the bibliographic attachment.

The SLAPS ground surface is essentially flat. It lies on the southeastern edge of a topographic depression known as the Florissant Basin. The Florissant Basin was created through bedrock erosion by a Mississippi River tributary. Sand, silt, gravel, and clay-rich materials filled this basin as glaciers blocked the tributary millions of years ago creating a quiet lake environment. The SLAPS lies essentially on the edge of this now sediment-filled ancient lake.

The stratigraphy on the western portion of the site depicts silty materials at ground surface that grade into fine sand and silty clay. At the 40-50 feet depth, a clay-rich unit is present that has been inferred to hydrologically separate the saturated lake deposits into two

groundwater systems in this area. The lake deposits below clay-rich unit on the western portion of the site consist mostly of silty clay and clayey and sandy gravel. Limestone, the uppermost bedrock formation, exists at depths of approximately 90 feet. Static water levels are usually about 8-10 feet below ground surface.

Beneath the eastern portion of the site lies one continuous sequence of saturated unconsolidated material. The materials grade from clayey silt to clayey and sandy gravel. This is the true edge of the ancient lake where bedrock erosion left weathered shale and coal exposed until subsequently covered by the deposits of the glacial lake to depths of 55 feet. The weathered coal and shale overlie the deeper limestone unit that is the upper bedrock on the western part of the site. No clay-rich potential confining clay-rich layer has been identified as present in the glacial lake sediments in this area. Static water levels are as shallow as 2-5 feet below ground surface. Due to limited drilling, true stratigraphic conditions between the eastern and western edge of the site are unknown.

Minimal characterization of the bedrock beneath the site has occurred. A single well has been completed in the limestone bedrock aquifer. This bedrock aquifer has historically been utilized for potable water in the Florissant Basin Area. Eight producing wells are known to have a existed within 3 miles of the site. Water quality is good in the limestone. This is characteristic of the glacial lake sediment area due to larger and more rapid recharge than in much of the St. Louis area geologic settings. The limestone is expected to produce enough water for private water usage and possibly some commercial usage.

PROCEDURES

To address the issues, the panel members reviewed the data, analyzed the conclusions drawn from previous DOE investigations and participated in a series of meetings focused on reviewing available site data. At these meetings, presentations were made by the technical personnel who had been associated with many of the previous studies. Panel members often requested supplementary information, explanation assumptions of processes and further analysis of available data. The responses to these requests were included as part of the panel review process. The panel members independently evaluated the data. There were meetings

and discussions to determine if a general concurrence existed relative to answers for the three questions reviewed by panel members.

The panel especially wants to thank David S. Miller of Science Applications International Corporation for his efforts in providing background information on the site to the panel and in responding to the panel's many requests for additional data analysis. Mr. Miller and the other DOE contractors involved in this process greatly simplified the panel's review through their thorough and timely presentations.

ANALYSIS

A number of factors were considered to be of major importance in supporting the conclusions and recommendations of the panel's review. The following listing describes conclusive information that the panel concurred upon:

1. Radionuclides are present in groundwater with higher concentrations identified near Coldwater Creek. A potential avenue exists for direct groundwater discharge of radionuclides to the creek.

2. Soil contaminated with radionuclides is present below the water table. Groundwater is in contact with a source of radionuclides under portions of SLAPS.

3. Significant levels of radionuclides are present in the soil at very shallow depths (i.e., less than 0.5 feet bls along McDonnell Boulevard on the northern boundary of SLAPS and the railroad tracts along the southern boundary). Much of the area is easily accessed by the public.

4. Groundwater monitoring has shown the migration of radionuclides in the direction of shallow groundwater flow across McDonnell Boulevard and under the formerly used ballfields property to the north. This factor raises concern over potential shallow discharges of radionuclides to Coldwater Creek to the west and the north. Low concentrations of radionuclides have been regularly detected in monitoring well B53W075. This well is approximately 800 feet north of the SLAPS property boundary

and is adjacent to Coldwater Creek. This might be expected, given the physical properties of the lacustrine (glacial lakebed) sediments.

5. Coldwater Creek sediments containing radionuclides extend downstream from the site for 7-8 miles. Although this condition may have resulted from historic erosion at the SLAPS before the present gabion wall was constructed, it may also be indicative of contaminated stormwater discharging from the present SLAPS drainage system. As late as the fourth quarter of 1994, one stormwater sample collected at SLAPS exceeded the DOE reference value for "Radiation Protection of the Public and the Environment."

6. Volatile organic chemicals have been found in groundwater at SLAPS. This poses two risks elements. These chemicals are individually important environmental contaminants. Second, they can provide the potential for facilitating transport of less mobile chemicals and other substances through the groundwater system.

7. Total carcinogenic risks from radionuclide exposure at SLAPS, as estimated in the baseline risk assessment prepared by Argonne National Laboratory in 1993, were 9.4×10^{-5}, 1.1×10^{-3}, and 1.1×10^{-1} for a SLAPS trespasser, maintenance worker, and future resident, respectively. Although these are relatively high values, the report points out that conservative, worst case scenarios were assumed in arriving at these estimates, especially with regard to future land use.

8. Most of the unconsolidated lacustrine sediments beneath the site are fine-grained and exhibit moderate horizontal permeabilities with lower vertical permeabilities. They also tend to absorb radionuclides.

9. There is limited groundwater use in the immediate SLAPS area. Also, most potable water used for public water supplies is from surface water sources (the Missouri and Mississippi Rivers).

10. The unconsolidated lakebed sediments are serving as a reservoir of fresh water recharge to the bedrock beneath the site. Potable water is present in the limestone bedrock aquifer that is normally saline in this general area.

Inconclusive data and information lead the panel to identify the following concerns and inadequacies:

1. Little is known about the areal extent of thickness of the potential clay-rich unit due to limited drilling to depth.

2. True separation of the groundwater above and below the potential confining unit is unknown. Aquifer tests were not conclusive. Only one field permeability test was completed on the potential confining unit. This test was made off-site and varied considerably from laboratory results.

3. The vertical extent of groundwater contamination is unknown beneath the middle portion of SLAPS. The stratigraphy beneath the center of the site also is not clearly defined. It is important to understand the conditions in this area.

4. Characterization of the materials and groundwater flow below approximately 50 feet is poor. Only one well has been completed in the limestone near SLAPS. Potentiametric maps for the lower units cannot be created due to lack of information.

5. Vertical flow gradients indicated by monitoring wells are inconclusive. Sediment accumulation has impacted water levels in wells. Steep downward gradients have been indicated on the southern SLAPS boundary. It is important to understand where steep vertical gradients truly exist to identify where shallow contamination may more readily move to depth.

6. Historically groundwater within a 3 mile radius of SLAPS has been utilized for industrial and private consumption. A current door-to-door survey to document present day groundwater use will identify any users at risk and any water production that may influence contaminant migration.

7. Sampling programs at SLAPS have not been consistent. Organic and inorganic analysis has not been regularly documented. No sampling occurred from 1992-1995.

8. Stream gauging information for Coldwater Creek at SLAPS is minimal. A true relationship between the creek and shallow groundwater is unknown.

9. The source and extent of TCE, DCE, and toluene contamination at the site is unknown.

10. One bedrock well sporadically shows elevated uranium levels. This well is completed in the coal and shale units that may contain naturally-occurring radiation. This well also is at the eastern edge of the site where the potential confining unit is known to be absent. It is important to understand if this is evidence of radionuclides moving to depth or if it is a natural phenomena.

MODEL PROJECTIONS

Because the issues raised by the St. Louis Task Force involved future impacts, the panel included in its deliberations the groundwater modeling study conducted by the DOE contractors. During several meetings with the contractors, the model parameters were reviewed and suggestions were made for modification of some of the parameters. The results of the modeling projected little environmental impact on Coldwater Creek or the bedrock aquifer for over 100 years. Conservatives assumptions were utilized even if they were not totally representative of the true site conditions. The panel recommended expansion of the model to provide a move complete picture of potential migration of radionuclides to Coldwater Creek and to the bedrock groundwater system as more data are obtained.

The panel concluded that the three-dimensional groundwater flow model completed to this point is reasonably sound. The calibration results based on simulation measured water levels in the upper groundwater system were acceptable. However, model calibration was completed with only a limited data set for the lower groundwater system. Limitations of that data include the fact that the stratigraphy underlying SLAPS has not been fully characterized, and significant gaps in various data sets are present. For example, the continuity and thickness of

the potential clay-confining layer across the site is not know. This unit has been thought to restrict vertical flow between the upper and lower groundwater systems; and therefore, also possibly restrict the movement of contamination. Determination of where this unit exists and its true permeability characteristics is important in defining the hydrology and possible movement of contamination at this sit. Also, the hydrology of the limestone and shale are not fully understood because of the lack of wells open to the bedrock at or near the site.

The flow model has not been verified in that the model has not been run with an independent set of data. This should be done so that the model can be utilized with confidence in the simulation of the distribution of concentration of radioactive constituents underlying the site. The current distance that radionuclides have already moved off-site must be simulated by the model with realistic assumptions. Comparison of streamflow in Coldwater Creek with simulated groundwater discharge to the creek is recommended in future calibrations.

CONCLUSIONS

As a result of the review of available data, analysis drawn from previous DOE investigations, and the modeling studies, the panel has developed a number of conclusions regarding existing levels, distribution and impact of contamination at the site as well as conclusions regarding projected levels and distribution of contamination in the future (100 years).

1. Radionuclides are present in shallow groundwater at SLAPS, and the result of the groundwater modeling study indicate that there will continue to be off-site migration of contaminants through the upper groundwater system toward Coldwater Creek. However, groundwater modeling indicates that levels of contamination would not exceed DOE guidelines for at least 100 years. The model results are consistent with the creek sampling data available for SLAPS, but not with shallow groundwater monitoring data.

2. The presence of radionuclides at the SLAPS has impacted sediment quality in the stream channel and banks of Coldwater Creek. This has been caused by stream bank erosion adjacent to the SLAPS and from sheet and gully erosion across the site.

Also, stormwater flow and flooding along Coldwater Creek has resulted in periods of accelerated erosion activity. Contaminant migration from soil erosion appears to have been more significant in the past. Current rates of erosion have been reduced from previous levels as a result of the natural re-establishment of vegetation over parts of the site and the construction of the gabion wall to control bank erosion along Coldwater Creek. However, neither of these features has completely eliminated the contribution of radionuclides into the surface waters of Coldwater Creek. Although the impact of these sources is not acute at this time, it does present a chronic problem to environmental quality along Coldwater Creek and should be corrected or mitigated.

3. Results of the groundwater modeling study indicate that the presence of radionuclides in the soil and upper aquifer system at SLAPS will not have a significant impact on the bedrock aquifer within the foreseeable future (100 years). However, the panel concluded that this deep groundwater system has not yet been sufficiently characterized, and that both the model and the conclusions drawn from the model will require verification as additional data becomes available.

4. The site is underlain by hydrogeological features that do not meet criteria for the location of a storage or disposal facility for radionuclide wastes. It is the conclusion of the panel that the site should not be used for the disposal of additional contaminated soil or other waste products. Physical, geological, and hydrological aspects of the site that do not meet present criteria for disposal of wastes include a shallow water table, a flood plain setting, the absence of a continuous and relatively thick confining layer, the unknown bedrock conditions, and finally, the accessibility of the site. It should be noted that the model and risk assessment assumed no additional waste material would be placed at the site.

IMMEDIATE ACTIONS

Although the results of previous studies indicate that the impact of radionuclide contamination from the SLAPS into Coldwater Creek and the deep groundwater system are not acute at this time, there are a number of actions that the panel believes should be implemented immediately. These actions would be designed both to mitigate the existing situation and the

facilitate future investigations of contaminant migration and remedial action studies. The actions suggested do not represent a conclusion from the panel with respect to a recommended level or method of remediation, but are actions the panel considers could be implemented to reduce the off-site migration of radionuclide contamination from the present site.

1. The gabion wall, which was constructed to prevent sediment erosion along the western creek bank, has resulted in significant reduced sediment contamination in Coldwater Creek. However, the proximity of the radioactive contamination to the creek, the presence of contaminated material within the floodplain, the stormwater runoff ditches and direct discharge pipe provide a rapid pathway for potential contaminant migration into the creek. There continues to be direct discharge of impacted material into the creek as indicated by the water-quality samples collected from one on-site stormwater sampling location. There is an immediate need to establish a site drainage control and prevention program to eliminate discharge of contaminated stormwater to Coldwater Creek.

2. The need for additional flood-protection facilities should be evaluated in order to maximize protection of the site from erosion during periods of flooding along Coldwater Creek.

3. The uncontrolled shallow soils contaminated with radionuclides found along McDonnell Road and the railroad right-of-way should be considered for removal as part of the ongoing remediation activities.

ADDITIONAL DATA ACQUISITION

The panel concluded that additional data will be required to develop a more complete hydrogeological assessment of the deep groundwater system and a more comprehensive analysis of contaminant sources. This information is considered necessary to more thoroughly assess potential off-site contamination and to verify the results of groundwater modeling.

1. Two deep monitoring wells should be installed that extend into the limestone bedrock. These wells should be designed to provide additional information on the deeper

subsurface stratigraphy and the hydraulics of the lower groundwater system. They should be included in the groundwater monitoring program.

2. Consideration should be given to installation of a (larger diameter) well so that it could yield sufficient water to stress the groundwater deeper than the 50 foot depth. A controlled aquifer test should be done to provide data that could be used to better characterize the various groundwater system and the potential confining unit.

3. Continuously recording stream gages should be installed upstream and downstream of the site. These would be useful in providing data for model simulation and determination of flow characteristics in Coldwater Creek. More water quality sampling of creek water should be implemented.

4. Additional information should be acquired on the levels and types of groundwater contamination in the central region of the site. In this area high concentrations of contaminants are present in the soil, yet data on the underlying groundwater quality are limited and the extent of contamination is poorly defined. The known extent of the potential confining unit in this area is also limited.

5. Additional information should be obtained on the nature and distribution of both organic and inorganic chemicals at the site. The data would be useful in helping to understand the hydraulic relation between the various geologic units and potential to enhance the migration of radionuclides.

6. A comprehensive long-range program should be established for the implementation of continued hydrogeologic assessment studies at the site. To date, the continuity of monitoring has been interrupted several times. Data collection and analysis must address surface and groundwater quality, static water levels, erosion, sedimentation, and contaminant migration through and from the site without continual interruption.

7. A door-to-door well survey documenting water use in the area will verify safety for the public and any potential influence on groundwater flow in the area.

8. Additional modeling of the site should be done. Once additional data are acquired on the lower unconsolidated units and bedrock beneath the site, projections on the vertical extent of contamination can be made. Modeling must also include the fate and migration of organic contaminants at the site as well as their impact on migration of radionuclides.

LONG RANGE PLANNING

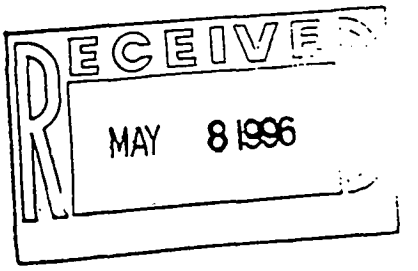
The panel suggests that a comprehensive long-range program be established for the implementation of future hydrogeologic assessment studies at the site. To date, the continuity of monitoring has been interrupted from time-to-time. Data collection and analysis should address surface and groundwater quality and flow, erosion, sedimentation and contaminant migration through and from the site. Water dating, aquifer testing, permeability testing and flow analysis are just a few of the investigations to consider as future plans are made.

Refinements in appropriate actions can be made as additional data are compared to the anticipated results and model predictions. If changes in site conditions are made which invalidate the model assumptions (i.e., additional waste is stored at the site or excavation of the waste occurs) then additional characterization of the impact and a re-evaluation of additional data needed will be necessary.

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Water Resources Division
1400 Independence Road
Mail Stop 100
Rolla, Missouri 65401

May 6, 1996



Mr. David Miller
Geraghty & Miller, Inc.
North Region
125 East Bethpage Road
Plainview, New York, 11803

Dear Mr. Miller:

At my request, Angel Martin prepared a summary of his input to the Expert Geohydrologic Panel for the records of the U.S. Geological Survey, Missouri District. A copy of his summary is enclosed for your information. We will be happy to participate in future activities of the St. Louis Airport Site.

James H. Barks
District Chief

cc: Jim Dwyer
Sally Price

Enclosure

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

WATER RESOURCES DIVISION
102 EAST MAIN STREET, 4TH FLOOR
URBANA, ILLINOIS 61801
(217) 344-0037
FAX (217) 344-0082

MEMORANDUM

April 22, 1996

To: Jim Barks 4-29-96
District Chief, WRD, Rolla, Missouri

From: Angel Martin, Jr.
Chief, Investigations Section, WRD, Urbana, Illinois

Subject: PROGRAMS AND PLANS: St. Louis Airport Site Review

As per our telephone conversation on Thursday, April 18, attached is a copy of the final report on the St. Louis Airport Site prepared by the Expert Geohydrologic Panel for the St. Louis Area Task Force. Also, per our conversation, I will summarize my participation in the panel and highlight specific comments primarily concerning the ground-water-flow modeling aspects of the material the panel reviewed.

I commented on all technical aspects of the work that had been performed at the site during all the meetings that I attended with the other panel members and the task force. I will briefly detail some of the most important comments I made during the review process.

1. From the beginning of my participation in the panel, I indicated the lack of streamflow information for Coldwater Creek. The last available streamflow data for the creek was in the 1960's. Continuously recording streamgages should be installed, as soon as possible, upstream and downstream of the site. Information from these gages will be useful in the understanding of the general hydrology of the site and in the calibration and verification of ground-water-flow modeling.

2. Concerning the ground-water-flow modeling aspects of the work, I would like to emphasize some key points. The three-dimensional ground-water-flow modeling completed to this point appears to be technically sound. The modelers have

completed model simulations utilizing a very conservative approach in describing the hydrologic characteristics of the ground-water system in order to estimate possible travel times of contaminants. It should be made clear that the modeling completed so far has involved the simulation of advective flow. No radionuclide or organic compound has been simulated in the ground-water system. It has been assumed that these compounds will move no faster than the advective flow of water particles in determining the lengths of travel times and possible discharge to Coldwater Creek.

Calibration of the three-dimensional model was accomplished with a minimum amount of data, especially for the lower aquifer system. In the U.S. Geological Survey, the model simulations completed so far would be considered, in my opinion, as "preliminary". A complete calibration, verification, and sensitivity analysis has not been performed. More data would need to be incorporated into the model as part of the additional data acquisition as described in the final report. This would include additional water levels, lithologic information, and hydrologic characteristics of the aquifers and confining units. After this process is completed, consideration can be given, if desired, for simulating solute transport of radionuclides or organic compounds in the ground-water system.

Please contact me at (217) 344-0037, extension 3030 if you have any questions or need additional information.

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ACRONYMS

AEC	Atomic Energy Commission
ALARA	As Low As Reasonably Achievable
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CWC	Coldwater Creek
DCE	Dichloroethylene
DOE	U.S. Department of Energy
DNT	Dinitrotoluene
EPA	U.S. Environmental Protection Agency
ERDA	Energy Research and Development Administration
FUSRAP	Formerly Utilized Sites Remedial Action Program
HISS	Hazelwood Interim Storage Site
INEL	Idaho National Engineering Laboratory
LLRW	Low-Level Radioactive Waste
LLW	Low-Level Waste
MDNR	Missouri Department of Natural Resources
MED	Manhattan Engineer District
MREM	millirem
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
ORO	Oak Ridge Office, U.S. Department of Energy
PRP	Potentially Responsible Parties
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation and Feasibility Study
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SLAPS	St. Louis Airport Site
SLAPSS	St. Louis Airport Storage Site
SLDS	St. Louis Downtown Site
SLUPP	St. Louis Uranium Processing Plant
TCE	Trichlorethylene
TNT	Trinitrotoluene
TEDE	Total Effective Dose Equivalent
UMTRAP	Uranium Mill Tailings Remedial Action Project
USGS	U.S. Geological Survey
U.S. EPA	U.S. Environmental Protection Agency
WSCP	Weldon Spring Chemical Plant
WSOW	Weldon Spring Ordnance Works

GLOSSARY

ALARA - As Low As Reasonably Achievable, or keeping radiation emissions and exposures to levels set as far below regulatory limits as is reasonably possible in order to protect public health and the environment.

alpha radiation - The most energetic but least penetrating form of radiation. It can be stopped by a sheet of paper and cannot penetrate human skin. However, if an alpha-emitting isotope is inhaled or ingested, it will cause highly concentrated local damage.

aquifer - A permeable body of rock capable of yielding quantities of groundwater to wells and springs.

ARARs - Applicable or relevant and appropriate requirements, a comprehensive set of laws and regulations that are relevant to guide the selection of cleanup activity at a particular site.

background radiation - The natural radioactivity in the environment. Natural radiation consists of cosmic rays, filtered through the atmosphere from outer space, and radiation from the naturally radioactive elements in the earth (primarily uranium, thorium, radium and potassium). Also known as natural radiation.

beta radiation - High-energy electrons (beta particles) emitted from certain radioactive material. Can pass through 1 to 2 centimeters of water or human flesh and can be shielded by a thin sheet of aluminum. Beta particles are more deeply penetrating than alpha particles but, because of their smaller size, cause less localized damage.

biological effects - The early or delayed results of biological damager caused by nuclear radiation (alpha, beta gamma).

carcinogen - A cancer-causing agent.

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act (also known as Superfund), the federal law that guides cleanup of hazardous waste sites.

CERCLA process - A process of site investigation and remediation as outlined in CERCLA regulations and guidance which include a remedial investigation, feasibility study, proposed plan, and record of decision, followed by remedy design and construction.

characterization - Facility or site sampling, monitoring and analysis activities to determine the extent and nature of a release. Characterization provides the basis for acquiring the necessary technical information to develop, screen, analyze, and select appropriate cleanup techniques.

cleanup - The general term for environmental restoration, the process designed to ensure that risks to the environment and to human health and safety from waste sites either are eliminated or reduced to prescribed, safe levels.

curie - A unit of measurement that represents the amount of radioactivity associated with one gram of Ra-226. One curie of any radioactive material emits radiation at the rate of 3.7 billion times a second.

daughter product - An element formed by the radioactive decay of another element; often daughter products are radioactive themselves

decay - The process whereby radioactive particles undergo a change from one form, or isotope, to another, releasing radioactive particles and/or energy.

decontamination - The removal of unwanted material (typically radioactive material) from facilities, soils, or equipment by washing, chemical action, mechanical cleansing or other techniques.

defense wastes - Radioactive wastes resulting from weapons research and development, the operation of naval reactors, the production of weapons materials, the reprocessing of defense spent fuel, and the decommissioning of nuclear-powered ships and submarines.

disposal - Waste emplacement designed to ensure isolation of waste from the biosphere, with no intention of retrieval for the foreseeable future.

dose - Quantity of radiation or energy absorbed; measured in rads. (See **rad**).

dose equivalent - A 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. Measured in rems. (See **rem**).

effluent - A waste discharged as a liquid.

element - Any of the 109 substances that cannot be broken down further without changing its chemical properties. Singly or in combination, the elements constitute all matter.

environmental restoration - The process of environmental cleanup designed to ensure that risks to the environment and to human health and safety from waste sites either are eliminated or reduced to prescribed, safe levels.

erosion control - Methods to control land surface features to prevent erosion by surface water or precipitation runoff.

EWMF - An engineered waste management facility, designed to store low-level radioactive wastes.

exposure - A measurement of the displacement of electrons from atoms caused by x-rays or by gamma radiation. Acute exposure generally refers to a high level of exposure of short duration; chronic exposure is lower-level exposure of long duration.

final disposition - Methods for permanent disposal of waste or contaminated media residuals following excavation/treatment.

gamma rays - Penetrating electromagnetic waves or rays emitted from nuclei during radioactive decay, similar to x-rays. Dense materials such as concrete and lead are used to provide shielding against gamma radiation.

geohydrologic - Pertaining to groundwater and its movements through the geologic environment.

geohydrology - The science dealing with underground water, often referred to as hydrogeology.

groundwater - Water beneath the earth's surface that fills pores between materials such as sand, soil or gravel. Groundwater is a major source of water for agricultural and industrial purposes and is an important source of drinking water for about half of all Americans.

half-life - The time required for a radioactive substance to lose 50 percent of its radioactivity by decay. The half-life of the radioisotope thorium-230, for example, is about 75,000 years. Starting with a pound of thorium-230, in 75,000 years there will be one-half pound of thorium-230, in another 75,000 years there will be one-fourth pound, and so on.

hazardous waste - A solid waste or combination of solid wastes that, because of quantity, concentration or physical, chemical or infectious characteristics, may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness or pose a substantial hazard to human health or the environment when improperly treated, stored, transported, disposed or otherwise managed. About 290 million tons of hazardous wastes are generated in the United States each year. A small percentage (about 4 percent) is recycled. The rest is treated, stored or disposed. Of the hazardous wastes disposed, most are injected as a liquid into the ground in specially designed injection wells. A large quantity is placed in surface impoundments (pits, ponds and lagoons). A small portion is placed directly on the land or buried.

heavy metals - Metals that are dense. Examples include mercury, lead, silver, gold and uranium.

isotopes - Atoms of the same element that have equal numbers of protons, but different numbers of neutrons. Isotopes of an element have the same atomic number by different atomic mass. For example, uranium-238 and uranium-235.

leachate - The solution formed when soluble components have been removed from a material.

leaching - To remove a soluble substance from a material by dissolving it in a liquid, and then removing the liquid from what is left.

LLW - Low-level waste, discarded radioactive material such as rags, construction rubble, glass, etc., that is only slightly or moderately contaminated. This waste usually is disposed of by land burial.

millirem - A unit of radiation dosage equal to one-thousandth of a rem.

mixed waste - Contains both radioactive and hazardous components.

mobility - The ability of radionuclides to move through food chains in the environment.

monitoring well - A hole drilled into the ground with a pipe inserted to allow for the collection of groundwater samples.

natural radiation - Radiation that is always present in the environment from such sources as cosmic rays and radioactive materials in rocks and soils. Also known as background radiation.

NPL - National Priorities List, the list of the nation's worst Superfund sites. SLAPS and the Latty Avenue properties were added to the NPL in October 1989.

nuclear radiation - Ionizing radiation originating in the nuclei of atoms; alpha, beta, and gamma radiation.

pathways - The means by which contaminants move. Possible pathways include air, surface water, groundwater, plants and animals.

picocuries (p/Ci) - Measurement of radioactivity. A picocurie is one million millionth, or a trillionth, of a curie, and represents about 2.2 radioactive particle disintegrations per minute.

pitchblende - A major ore of uranium and radium. Pitchblende from the former Belgium Congo contains extremely high percentages of uranium.

plume - A defined area of groundwater containing contamination that originates from a particular source such as a waste unit.

rad - Radiation absorbed dose, a measurement of ionizing radiation absorbed by any material. A rad measures the absorption of a specific amount of work (100 ergs) in a gram of matter.

radiation - Fast particles and electromagnetic waves emitted from the nucleus of an atom during radioactive disintegration.

radioactive - Giving off, or capable of giving off, radiant energy in the form of particles (alpha or beta radiation) or rays (gamma radiation) by the spontaneous disintegration of the nuclei of atoms. Radioisotopes of elements lose particles and energy through the process of radioactive decay. Elements may decay into different atoms or a different state of the same atom.

radioactive waste - A solid, liquid or gaseous material of negligible economic value that contains radionuclides in excess of threshold quantities except for radioactive material form post-weapons-test activities.

radioisotope - An unstable isotope of an element that eventually will undergo radioactive decay (i.e., disintegration). Radioisotopes with special properties are produced routinely for use in medical treatment and diagnosis, industrial tracers, and for general research.

radionuclide - A radioactive species of an atom.

radon - A radioactive gas produced by the decay of one of the daughters of radium. Radon is hazardous in unventilated areas because it can build up to high concentrations and, if inhaled for long periods of time, may cause lung cancer.

RCRA - Resource Conservation and Recovery Act, the federal environmental law designed to account for and ensure proper management of hazardous wastes, from creation to disposition

rem - Roentgen equivalent man, a unit used in radiation protection to measure the amount of damage to human tissue from a dose of ionizing radiation.

remedial action - Long-term cleanup activities

remediation - Those activities performed to remove or treat hazardous waste sites or to relieve their effects.

removal action - Interim cleanup activities that are identified as needed to protect public health and the environment

restoration - (See **environmental restoration**)

RI - Remedial investigation, the CERCLA process of determining the extent of hazardous substance contamination and, as appropriate, conducting treatability investigations.

RI/FS - Two distinct, but related studies, the remedial investigation and feasibility study. Together, they characterize environmental problems and outline remedial actions to solve those problems.

Risk Assessment (RA) - Risk assessment, the study and estimation of risk from a current or proposed activity. Involves estimates of the probability and consequence of an action.

risk management - The process of evaluating alternative regulatory and non-regulatory responses to risk and selecting among them. The selection process necessarily requires the consideration of legal, economic and social factors.

sludge - A semi-solid residue from any of a number of air or water treatment processes. Sludge can be a hazardous waste.

Superfund - The program operated under the legislative authority of CERCLA and SARA that funds and carries out the EPA solid waste emergency and long-term removal remedial activities. These activities include establishing the National Priorities List, investigating sites for inclusion on the list, determining their priority level on the list, and conducting and/or supervising the ultimately determined cleanup and other remedial actions.

somatic effects - Effects of radiation limited to the exposed individual, as distinguished from genetic effects, which also affect subsequent, unexposed generations.

stable isotope - An isotope of an element that is not radioactive

teratogenic - Effects of radiation on fetus and embryos

thorium - A naturally-occurring radioactive element

threshold dose - The minimum dose of radiation that will produce a detectable effect.

toxic - Relating to a harmful effect by a poisonous substance on the human body by physical contact, ingestion or inhalation.

toxicology - The science that deals with poisons and their effects on plant, animal and human life.

treatment - Any activity that alters the chemical or physical nature of a waste to reduce its toxicity or prepare it for disposal.

uranium - The heaviest element found in nature. Approximately 997 out of every 1000 uranium atoms are uranium-238. The remaining 3 atoms are the fissile uranium-235. The uranium-235 atom splits, or fissions, into lighter elements when its nucleus is struck by a neutron.

UST - Any underground storage tank or associated piping containing hazardous materials.

vitrification - A method of immobilizing waste that produces a glass-like solid that permanently captures the radioactive materials by chemically binding the radionuclides to the glass.

waste minimization - Employing new techniques to reduce the amount of hazardous and radioactive wastes generated to as low a level as possible.

Sources:

Glossary of Environmental Restoration Terms and Acronym List (EPA/OPA-87-017, August 1988)

Glossary of Environmental Restoration (DOE, Office of Environmental Restorations and Waste Management, Oak Ridge Operations, October 1990 and October 1991)

APPENDICES

A. Mission and Charter

B. List of Task Force Members

C. The History of the St. Louis Uranium Processing Plant Radioactive Waste Sites

D. Executive Order 11988

E. Post Maquoketa Aquifer Well Records

F. Resolutions

Task Force - to Secretary O'Leary - June 18, 1996

Task Force - Implementation Strategy - July 23, 1996

Task Force - Technology Preferences - August 20, 1996

City of Hazelwood Resolution # 9610

St. Louis Board of Aldermen Resolution # 67

St.Louis County Resolution # 3991

City of Florissant Resolution # 797

G. Letter of Request

St. Louis Utilities - St.Louis County Water, Laclede Gas Company, St. Louis Metropolitan Sewer District and Union Electric

H. Governance Support

Senator Bond – June 3, 1996

County Executive Westfall and Mayor Bosley – June 13, 1996

Richard Fleming (Regional Commerce and Growth Association)

and Dennis Coleman (St. Louis County Economic Council) – June 13, 1996

Govenor Carnahan – June 24, 1996

County Executive Westfall and Mayor Bosley – July 19, 1996

Congressman Talent – August 13, 1996

Congressmen Clay and Gephardt – August 29, 1996

Appendix A

Mission and Charter

Appendix A
St. Louis Site Remediation Task Force
Mission and Charter

Mission Statement

The St. Louis Site Remediation Task Force is a broadly representative body formed in September 1994 to identify and evaluate feasible remedial action alternatives for the cleanup and disposal of radioactive waste materials at the St.Louis FUSRAP Site and at West Lake Landfill, and to petition the U.S. Department of Energy to pursue a cleanup strategy that is environmentally acceptable and responsive to public health and safety concerns. In the event consensus is not achieved, the task force report will include alternative recommendations to ensure that the points of view of all members are expressed.

Scope and Purpose

The primary focus of the Task Force is to 1) develop, 2) evaluate and 3) prioritize options for the cleanup and disposal of contaminated materials present at the St. Louis Site. At the conclusion of this process, the group will submit recommendations to the Assistant Secretary for Environmental Management.

Policy issues to be covered by the Task Force will include, but may not be limited to, cleanup priorities, soil treatment, inaccessible soils, and permanent disposal options.

Responsibilities and Expectations

Task Force members will:

- Be informed of site history and site related issues
- Consider multiple points of view and relevant factors as a means of fostering problem solving and consensus building
- Make concerted efforts to keep their respective constituencies/stakeholder groups informed about task force activities and recommendations
- Attend and actively participate in regular meetings, read and be prepared to comment on documents, and be available to work between formal meetings if necessary
- Develop and follow a work plan that schedules and milestones
- Select a facilitator who will be charged with among other things, establishing groundrules, keeping the process on schedule, and the meetings focused and productive
- Elect a chairperson and charge him or her with specific duties and responsibilities

The chairperson will:

- Represent the group in official communications with DOE senior management and with the media
- Preside at the Task Force meetings
- Set the times, location and agendas for meetings
- Appoint committees
- Retain consultants and otherwise be responsible for administrative matters before the Task Force.

The DOE will:

- Assist the Task Force by providing technical expertise and by assuring that information necessary for the Task Force's deliberations is made available in a timely matter
- Honor, respect and give serious consideration to the views, recommendations, and advise of the Task Force
- Work with the Task Force to provide assistance, staff, administrative support, facilitator, and access information deemed necessary to fulfill the mission
- Help the Task Force members develop and distribute informational materials to their constituencies and to the general public
- Provide financial support
- Make no attempt to control the Task Force or its agenda

Membership

The Task Force is comprised of members of the City and County appointed oversight commissions plus members designated by DOE as representatives of additional stakeholder groups. These groups include owners of contaminated residential and commercial properties, civic activists, congressional field staff, and representatives of agencies that have regulatory authority at the site.

Ground Rules

- Task Force meetings will be open to the public. A 10-minute period will be allocated for public comment at the beginning of each meeting. Written comment will be accepted at any time. Address comments to DOE Public Information Center, 9170 Latty Avenue, St.Louis, Missouri 63134
- Beyond the public comment period, only duly appointed Task Force members, invited advisors and others scheduled on the agenda may speak during a meeting
- Task Force members agree to participate fully and consistently in the process unless they withdraw
- A Task Force member may designate a substitute when he/she is unable to attend a meeting
- Each Task Force member agrees to fully explore and consider all issues before reaching conclusions
- Each Task Force member is committed to seeking agreement and agrees to search for creative opportunities to address all the interests and concerns of all participants
- Each participant acknowledges responsibility to other participates, to their constituencies, to the process, and agrees:
  - that meetings shall begin and end on schedule
  - to stay on topic and task
  - to candidly identify and share their interests and those of the constituency they represent and to represent and speak for their constituency
  - to listen carefully and respectfully to other participants and to avoid interrupting other participants
  - to offer suggestions with respect and care
  - to share relevant information regarding the issues under consideration

- to communicate with each other directly, rather than through the news media
- to respect the decision of any participant to withdraw from the consensus-building process at any time and for any reason
- to explain to other participants the reason for withdrawal from the consensus-building process
- to objectively explain and interpret the consensus building process to their constituency, to keep their constituents informed of the activities and the ideas of the process, and to seek the advice of their constituents throughout the process
- to challenge ideas – not people
- to jointly develop a strategy for dealing with the issues of agreement that cannot be reached

- The chairperson or designee will serve as the spokesperson for the Task Force

Meetings

The Task Force will have regular public meetings as well as working group meetings which may be announced in advanced. Minutes of all meetings will be available. Should scheduling conflicts arise, members may send alternates who would be expected to represent the designated member in discussions and decision-making.

Work Product

Recommendations to DOE will be in the form of written report(s) and will address the concerns listed above under "scope and purpose." Debate on these topics should take into account, among other factors: 1) federal (e.g., CERCLA) requirements 2) state of Missouri regulations and disposal criteria, 3) budgetary constraints, and 4) available data on health effects and risk posed by contaminates at the site.

The Task Force will work toward consensus whenever possible. Where consensus cannot be reached, the report will describe areas of agreement and disagreement as well as the reasons why differences cannot be bridged.

Termination of Task Force

The Task Force will dissolve following fulfillment of its stated purpose, i.e. the submission of site cleanup recommendations to the DOE Assistant Secretary, unless the Task Force agrees to an expansion of its charter.

Appendix B

List of Task Force Members

Appendix B
St. Louis Site Remediation Task Force
Members

County Commission
Sally Price (Chair)
Redacted - Privacy Act

Kay Drey
Redacted - Privacy Act

Art Jackson
Redacted - Privacy Act

Nancy Lubiewski
Redacted - Privacy Act

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St. Louis, MO 63141

William Conant, Jr.
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City Commission
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Tom Manning
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Ray Rolen
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U.S. Representative James Talent
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Virginia Cook
U.S. Representative William Clay
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St.Louis, MO 63112

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Neal Slaten
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City Commission – Mayor's Advisory Task Force on Radioactive Waste

Appendix C

The History of the St. Louis Uranium Processing Plant Radioactive Waste Sites

THE HISTORY OF THE ST. LOUIS URANIUM PROCESSING PLANT RADIOACTIVE WASTE SITES

St. Louis Site
Remediation Task Force

May 13, 1996

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THE HISTORY OF THE ST. LOUIS URANIUM PROCESSING PLANT RADIOACTIVE WASTE SITES

"The story of the supply of uranium is by itself a thrilling one, and the production of enough pure metallic uranium to do our task in time was a technological and industrial miracle."
--Arthur Holly Compton

A PERSPECTIVE

The legacy of radioactive waste in the greater St. Louis area is a complex story involving an unprecedented and top-secret commitment that launched the United States into the nuclear age. It is a story of how the St. Louis based Mallinckrodt Chemical Company became the first industrial-scale producer of uranium metal and uranium oxide, and eventually one of the three largest uranium refiners in America. It is a story of how the uranium produced by Mallinckrodt was used in the development of the first atomic bombs and many of the bombs that were later developed in the following Cold War period.

It is a story of how St. Louis and other communities responded unquestioningly to the needs of the Nation's World War II effort and the extended Cold War period that followed. Today many people have forgotten that the Mallinckrodt Chemical Company, along with the

Weldon Spring Chemical Plant in St. Charles County, Missouri and the Feed Materials Production Center in Fernald, Ohio were the three major sites in America where uranium was refined and where large amounts of radioactive waste were generated as a result of the process.

And sadly, it is a story of how hundreds of thousands of tons of radioactive waste were poorly managed and spread from one downtown production site to contaminate in excess of 100 properties in the St. Louis metropolitan area. It is also a story of how 50 years of flawed decisions and outright mistakes contributed to one of the nation's most complex radioactive waste problems.

The radioactive waste sites in and around the St. Louis area can be collectively called the St. Louis Uranium Processing Plant (SLUPP) radioactive waste sites.

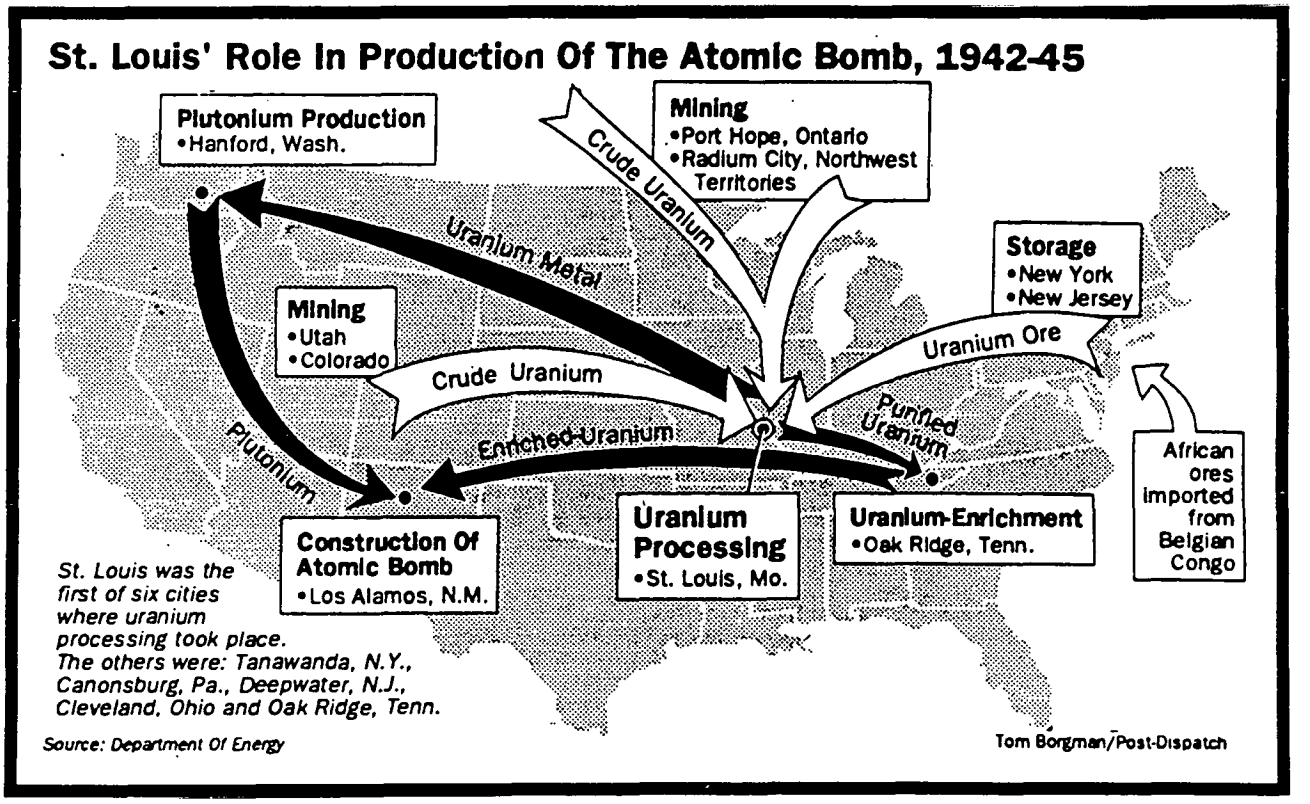


Figure 1. St. Louis Uranium Plant's (SLUPP) Role in the Production of the Atomic Bomb, 1942-45, from St. Louis Post-Dispatch, Feb. 12, 1989, page 4.

A Comparison of Radioactive Waste At Four U.S. Uranium Refining Facilities 1942-1989

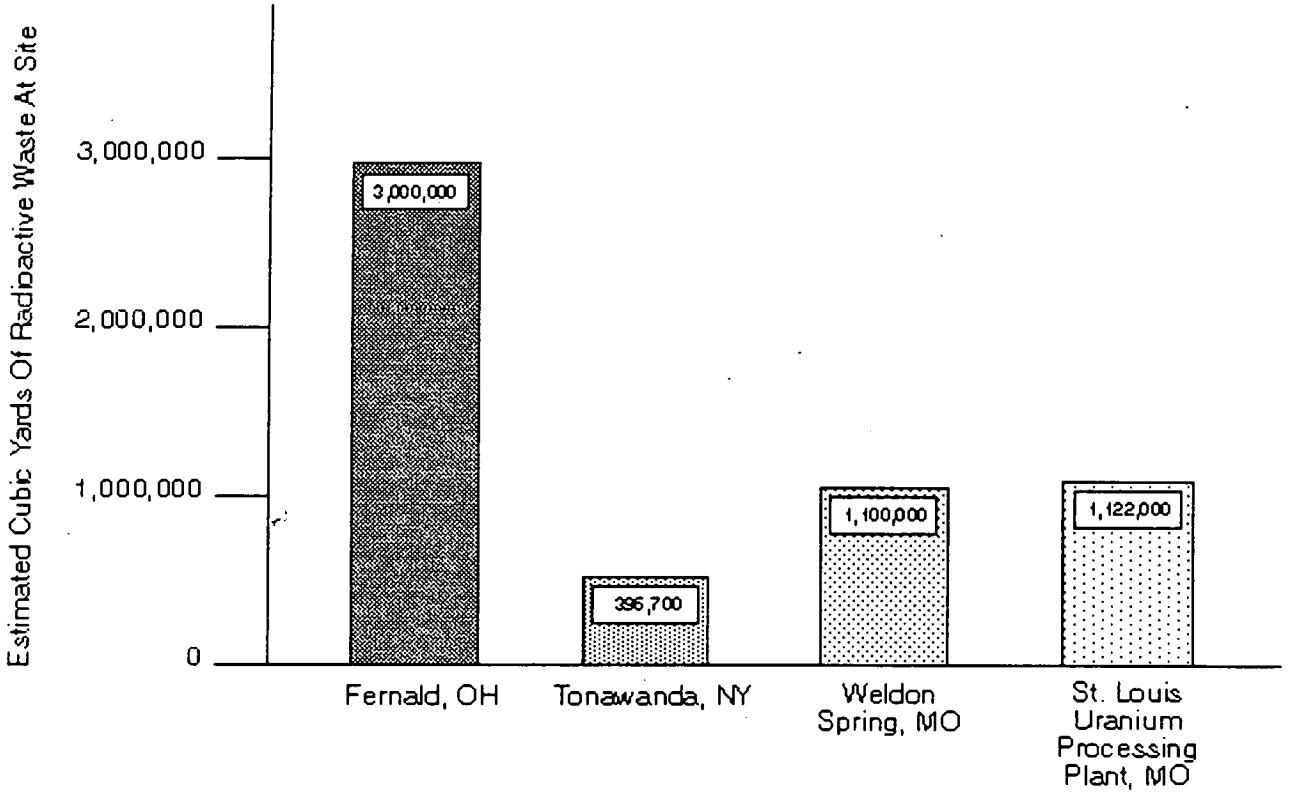


Table 1. A comparison of Radioactive Waste Of Four U.S. Uranium Refining Facilities 1942-1989.

THE BEGINNING

In late 1938 and early 1939, German chemist [Redacted - Privacy Act] and Austrian physicist [Redacte] e were the first to split an atom of uranium. Meitner and another Austrian physicist, [Redacted - F] advanced the theory that when an atom of uranium is bombarded by neutrons, it splits into smaller atoms and releases energy. They coined the word *fission* for this process.

On August 2, 1939, the famous scientist Albert Einstein wrote a letter to President Franklin D. Roosevelt. The letter pointed out that the "element uranium may be turned into a new and important source of energy in the immediate future." The letter also explained that a nuclear chain reaction may be possible and that such a reaction could lead to the construction of a new type of bomb. Einstein asked Roosevelt to approach "Government Departments" to keep them informed, to put forward "recommendations for Government action," and to "speed up experimental work by providing funds to University Laboratories."

In October 1939, as Einstein had suggested, President Roosevelt created a secret Advisory Committee on Uranium to investigate the feasibility of developing an atomic bomb.

Whether or not Roosevelt personally read Einstein's letter is subject to debate. Richard Rhodes, author of *The Making of the Atomic Bomb*, believes that Alexander Sachs, Roosevelt's economic advisor, actually paraphrased Einstein's letter to Roosevelt. Rhodes also believes it was the briefing by Sachs that resulted in the establishment of the secret Advisory Committee on Uranium. There is no known written record, no executive order, no smoking gun pointing to Roosevelt's decision to pursue the development of the atomic bomb.

On September 1, 1939, Adolph Hitler invaded Poland and initiated a chain of events that led to World War II. On December 8, 1942, one day after the bombing of Pearl Harbor, the United States declared war on Japan and Germany. This sealed America's destiny with atomic energy.

THE MANHATTAN PROJECT

A key element in the development of the atomic bomb was to prove that a sustainable and controlled nuclear reaction was indeed possible. A major experiment was needed to prove that a fission reaction could be controlled. The need for this proof led to the U.S. Army's Manhattan Engineering District project, widely known as the Manhattan Project. If scientists could initiate a controlled nuclear reaction, they would pave the path for the Manhattan Project to go on to the development of the atomic bomb.

The Manhattan Project took shape under the bleachers of the Stagg Field Stadium at the University of Chicago. Under the leadership of Enrico Fermi, the great physicist from Italy, a group of distinguished scientists were assembled to begin the project. Many of them already were, or would soon be, Nobel Prize winners. Like the Apollo Project of the 1960's to land a man safely on the moon and bring him back, this was a project of the highest national urgency. Unlike the Apollo Project, the Manhattan Project was conducted under the highest level of national security and secrecy.

The Manhattan Project scientists would need to build an "atomic pile" where a large amount of graphite, uranium metal, and uranium oxide could be assembled. For the project to succeed, they calculated they would need 40 tons of uranium oxide and six tons of uranium metal. This represented unimaginable amounts of these substances. At that time, uranium metal had only been produced in very small quantities in a few labs as an experimental product. In early 1942, the entire world's supply of refined uranium consisted of only a few ounces that would fit into a coffee cup. To refine 40 tons of relatively pure uranium oxide would be a formidable obstacle.

ST. LOUIS BECOMES INVOLVED

One of the noted scientists working on the Manhattan Project was Arthur Holly Compton. Compton was a well-known Nobel Prize-winning physicist from Washington University in St. Louis. Compton had an idea about how to get the 40 tons of uranium; he knew Edward Mallinckrodt Jr., president of Mallinckrodt Chemical Works. Compton was aware that Mallinckrodt had a reputation for producing pure chemicals and an ability to work with ether, a volatile solvent that Mallinckrodt produced commercially for anesthesia. Ether was also the key solvent that would be used to refine and purify uranium ore.

On the morning of April 17, 1942, Compton and Mallinckrodt had lunch together at St. Louis' Noonday Club, 319 North Fourth Street. Compton talked and Mallinckrodt listened. Compton, using his best powers of persuasion, told Mallinckrodt how the Allies were losing the war and how intelligence reports had indicated that the Germans were two years ahead of the Allies in the development of the "ultimate weapon." Compton asked Mallinckrodt to do what three other companies were unable or afraid to do—use ether to refine large amounts of uranium ore to produce uranium metal and uranium oxide. The other companies knew all too well the explosive nature of ether. They were concerned about the danger from an ether explosion, not exposure from radioactivity. Mallinckrodt thought it over briefly and said "yes." The deal was sealed with a handshake. The project was done as a contract between Mallinckrodt Chemical Works and the Manhattan Engineering District. It is of interest to note that the contract was not finalized until after much of the uranium for the Manhattan Project had already been produced by Mallinckrodt.

THE PROCESS OF REFINING URANIUM

Within a week the project was under way and by July 1942, only three months later, Mallinckrodt was producing a ton of pure uranium oxide a day.

The magnitude, scope, and danger of this effort was unparalleled. Mallinckrodt needed materials that were difficult, if not impossible, to secure during wartime. They salvaged pipes, kettles, motors, and other equipment from the company's plants in other states. Engineers drew plans on scrap paper, and carpenters and pipefitters constructed the apparatus the next day. Workers labored around the clock to install the necessary production equipment. All of this happened under the highest national security level possible. The workers did not know what they were building, and the scientists who had an inkling of what was happening at Mallinckrodt were dogged by agents from the Federal Bureau of Investigation to ensure confidentiality.

The process of refining the uranium ore was dangerous. Ether is extremely flammable and explosive. The refining process required that heated uranium ore be mixed with ether. No one knew the correct proportions of ether and uranium ore to mix, or the temperatures at which the materials could safely be combined. Small experiments were tried in out-of-the-way places at the plant so that if an explosion occurred, the buildings and equipment would not be damaged. Again, after working day and night, a safe process was identified. Now all that was needed was a large quantity of uranium ore.

FINDING THE URANIUM ORE

To produce the 40 tons of uranium oxide needed for the Manhattan Project would require hundreds of tons of pitchblende, the richest uranium ore, or thousands of tons of carnotite, a lower grade ore. In 1940, Belgium had sent 1,250 tons of Belgian Congo, currently known as Zaire, ore to Staten Island, New York, to prevent it from falling into German hands. The ore then was transferred to Port Hope, Ontario, for processing. The processed ore then was shipped to the Lake Ontario Ordnance Works near Niagara Falls, New York. This ore was extremely rich, ranging as high as 70 percent uranium. In his 1939 letter to Roosevelt, Einstein had pointed out that the United States ores were generally of very poor quality and found in only modest amounts; the most important source of uranium was the Belgian Congo. The ore was purchased and shipped to Mallinckrodt in St. Louis. This provided the first ore for the refining of uranium by Mallinckrodt. This ore was not only rich in uranium, but it contained high amounts of thorium and radium. These other elements will later play a key role in the radiological contamination in the St. Louis area.

Originally the contract between the United States and the Belgian Congo stated that the U.S. had bought only the uranium from the ore, and that all radium containing residues were to be held for the eventual return to the Belgian Congo. This indicates why the radium containing wastes were "stored" as opposed to being disposed of by dumping or other means.

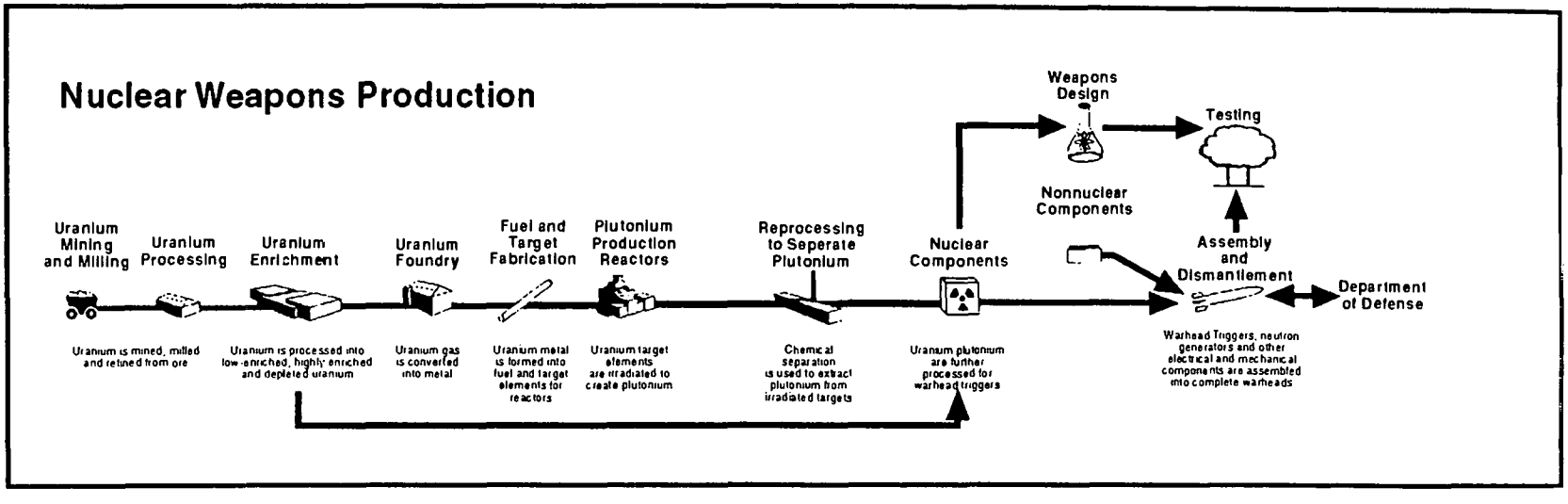


Figure 2. Nuclear Weapons Production Process, Closing the Circle on the Splitting of the Atom, USDOE, 1995, page 2, 3.v.

THE NUCLEAR AGE BEGINS

On December 2, 1942, under the stands of Stagg Field Stadium at the University of Chicago, the Manhattan Project produced the first man-made sustained and controlled nuclear reaction in history. The project was a success, and the production of an atomic bomb was under way. It had been only 225 days since the handshake agreement between Compton and Mallinckrodt at the Noonday Club. The entire 40 tons of uranium oxide used in the atomic pile had been manufactured at the Mallinckrodt industrial site in downtown St. Louis.

Now Mallinckrodt's effort focused on producing uranium not for experiments but for nuclear weapons. More uranium ore came to St. Louis from Canada, Colorado, and Utah. On July 16, 1945, the first atomic bomb was detonated at the Trinity Test site near Alamogordo, New Mexico. On August 6 and 9, 1945, atomic bombs were used against Japan at Hiroshima and Nagasaki. Japan surrendered within days rather than face another bomb. The Manhattan Project had developed a working atomic bomb in less than three years.

In 1939, Nobel Prize-winning physicist Neils Bohr had argued that building an atomic bomb "can never be done unless you can turn the United States into one huge factory." Years later he told his colleague Edward Teller, "I told you it couldn't be done without turning the whole country into a factory. You have done just that."

INCREASED URANIUM PRODUCTION - THE COLD WAR

Japan's surrender in 1945 marked the end of one war and the beginning of another. This new "Cold War" led to a build-up of nuclear arms in a race against the Soviet Union.

The result of this new struggle to have the largest nuclear weapons stockpile again affected St. Louis. Mallinckrodt Chemical Works, now renamed Mallinckrodt Chemical Company, had the skill and equipment left over from the Manhattan Project and the development of atomic weapons for World War II to be the major producer of weapons-grade uranium. From 1942 to 1957, the Mallinckrodt plant in downtown St. Louis produced uranium. In 1957, Mallinckrodt, under contract from the Atomic Energy Commission (AEC), moved the production of uranium to a new facility that the AEC built at the site of a former U.S. Army TNT production facility at Weldon Spring in St. Charles County, Missouri. The Weldon Spring facility functioned from 1957 to 1966. Mont Mason, whose role as Mallinckrodt Radiation Safety Officer is later discussed, has stated that "in the 24 years Mallinckrodt operated uranium facilities in St. Louis and St. Charles County, more than 3,300 employees produced in excess of 100,000 tons of purified natural uranium materials."

From the first experiments at Mallinckrodt's downtown facility in 1942, to the end of production at the Weldon Spring facility in 1966, the process to refine the ore had become more sophisticated. Larger percentages of uranium could be recovered from similar grades of ore. Knowledge about the adverse health effects of radiation had increased as had knowledge of how to more safely handle the material. However, knowledge about how to handle the waste had progressed much more slowly.

MONT MASON AND HEALTH EFFECTS

In the early days, little was known about the health effects of radiation. In 1947, Mont Mason, director of Radiation Safety at Mallinckrodt, became concerned about uranium workers' health. Mason was a preacher without a congregation. As Mason would try to discuss possible adverse health effects of radiation, workers would scoff and not pay attention. Most of them didn't even know what kind of project they were working on, and medical knowledge of the health effects of radiation was still rudimentary. The naivete of workers regarding radiation at the time was incomprehensible by today's standards. One worker, uttering what has became a classic statement, is alleged to have said, "I don't know what the stuff is, but they tell me it's radioactive—so it must be for radios." The workers were more concerned that the special project they had been working on continue so that they could receive the overtime hours they had been earning the past five years. Later, Mason would recall incidents of workers handling radioactive materials and waste with their bare hands and even spilling uranium dust on themselves. The workers and their supervisors just did not seem to care. This attitude of nonchalance was also key in understanding the manner in which the waste was handled. After all, if the pure uranium ore didn't hurt you, how could the waste products harm you?

In the text, *Environmental Radioactivity From Natural, Industrial, and Military Sources*, author Merril Eisenbud established the link between the danger to workers and the relation to radioactive wastes. "These uranium refining processes . . . involve potential exposure of the employees to alpha-emitting dusts and, in the case of high-grade fuels, to radon and gamma radiation . . . the plants hastily constructed during World War II had insufficient control over dusts contained in exhaust air, and relatively large amounts of uranium were discharged to the

outside atmosphere . . . The kinds of wastes produced by the refineries depend on the type of feed that is processed. During World War II and for a few years thereafter, when high-grade ores were processed that contained as much as 100 mCi ^{226}Ra per ton of ore, some of the sludge contained as much as 1 Ci ^{226}Ra per ton," the author says. In other words, the waste sludge contained ten times as much radium as the original ore.

Since the 1940's, health standards regarding radiation exposure have been a moving target. As one example, beginning in 1948 and continuing until 1950, and again from 1957 to 1962, the AEC financed several cleanups at the downtown Mallinckrodt site. In 1962, believing the site to be clean, at least by the radiological health standards of the day, the AEC returned the downtown uranium complex sites to Mallinckrodt stating that they were suitable for "unrestricted use."

It is of interest to speculate about the question, "If we had known as much about the adverse health effects of human exposure from processing uranium and being exposed to the resulting radioactive waste, would we have chosen a site in the center of Missouri's largest urban population center to do the processing?"

Unfortunately, most people have forgotten just how important the St. Louis area was in the production of uranium. Many people are familiar with the Manhattan Project, the story of Los Alamos, and the dropping of the atomic bombs on Japan. Very few people can relate the role of Mallinckrodt in the production of uranium. It has been said that, "During the 25 years that it was involved in uranium production, Mallinckrodt made numerous contributions to uranium-processing technology. . . Mallinckrodt has played an important part in uranium metals technology in the United States since the first serious efforts were directed towards the

development of a commercial production process." Mallinckrodt operated the only production plant for uranium from the beginning on April 17, 1942, until they were joined by the opening of a plant at Fernald, Ohio in 1951.

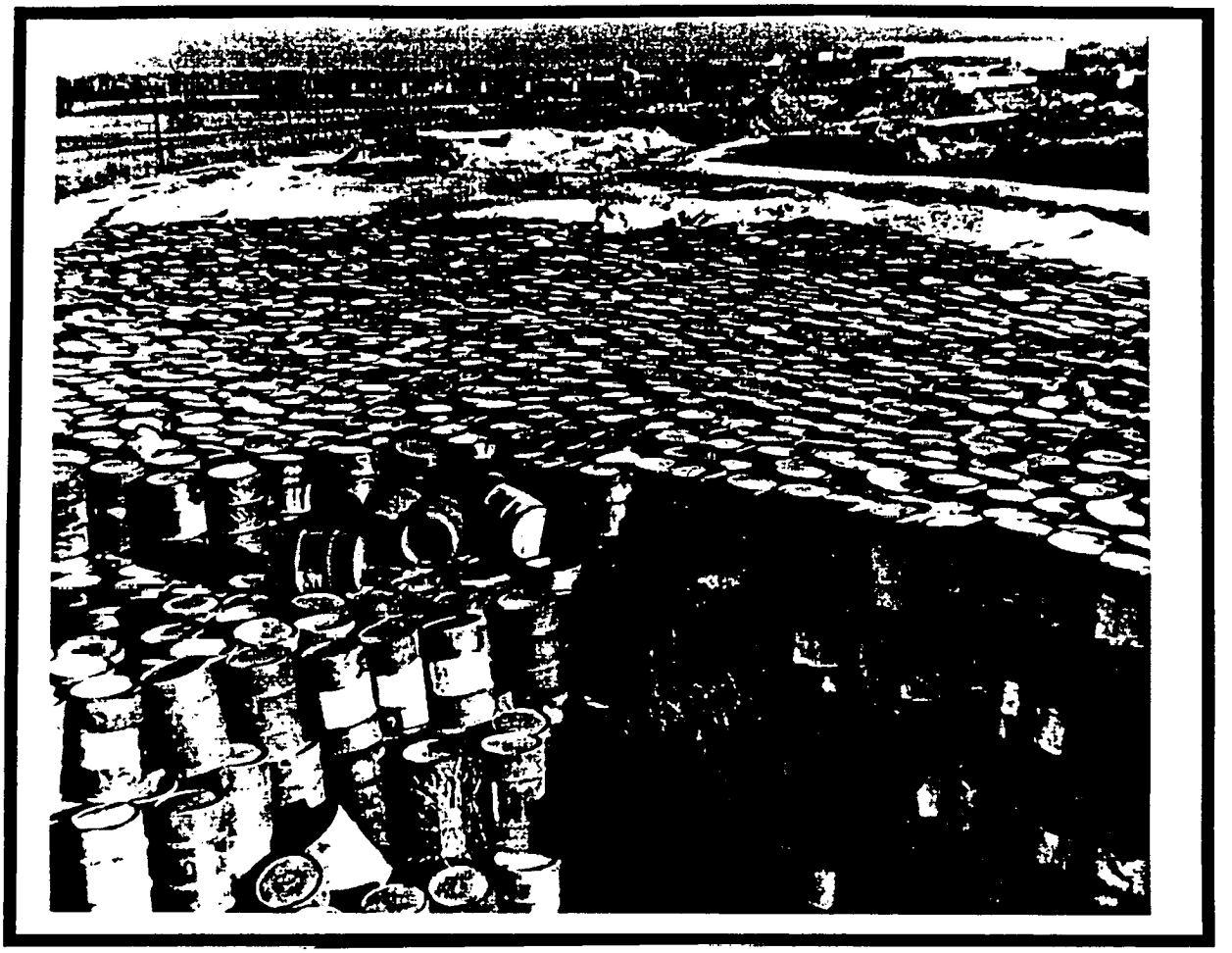
THE FIRST STORAGE SITE FOR RADIOACTIVE WASTE - ST. LOUIS AIRPORT STORAGE SITE (SLAPSS)

It became obvious that there would be large quantities of waste materials associated with the production of uranium at Mallinckrodt. On January 3, 1947, the Manhattan Engineering District (MED) condemned 21.7 acres of land near the Lambert Airport in north St. Louis. This site, the St. Louis Airport Storage Site (SLAPSS)*, was to be used as a storage area for process waste and residues from the downtown Mallinckrodt site. The site was operated by MED in 1946, the AEC from 1947 to 1953, and by Mallinckrodt under contract from the AEC from 1953 to 1967. The SLAPSS received wastes from the Mallinckrodt downtown facility that included pitchblende raffinate, radium bearing wastes, barium cake residue, Colorado raffinate residues, and other wastes. This represented a tremendous quantity of waste at the SLAPSS. One report regarding just the barium sulfate cake indicates that the cake pile, up until 1960, was about "25 feet high and covered three acres." In 1948, the site received some highly radioactive radium bearing wastes from Lake Ontario, New York. In 1954, the site also received 60 tons of captured Japanese sand that contained uranium waste and residues.

The methodology for storing the waste at the SLAPSS was haphazard and would not be considered safe by today's standards. Much of the waste was hauled by dump trucks to the SLAPSS and stored uncovered in piles. No consideration was given to controls for groundwater, surface water, exposure pathways, or other basic safety standards which are observed today. In

* Editor's note: This site is sometimes referred to as the St. Louis Airport Site (SLAPS). I have chosen to be consistent throughout this report and use the more historical term SLAPSS. The reader should not become confused when reading SLAPSS or SLAPS. They are one and the same. *BP.*

addition, some of the radioactive process residue was hand packed by Mallinckrodt workers into barrels and transported to the site.

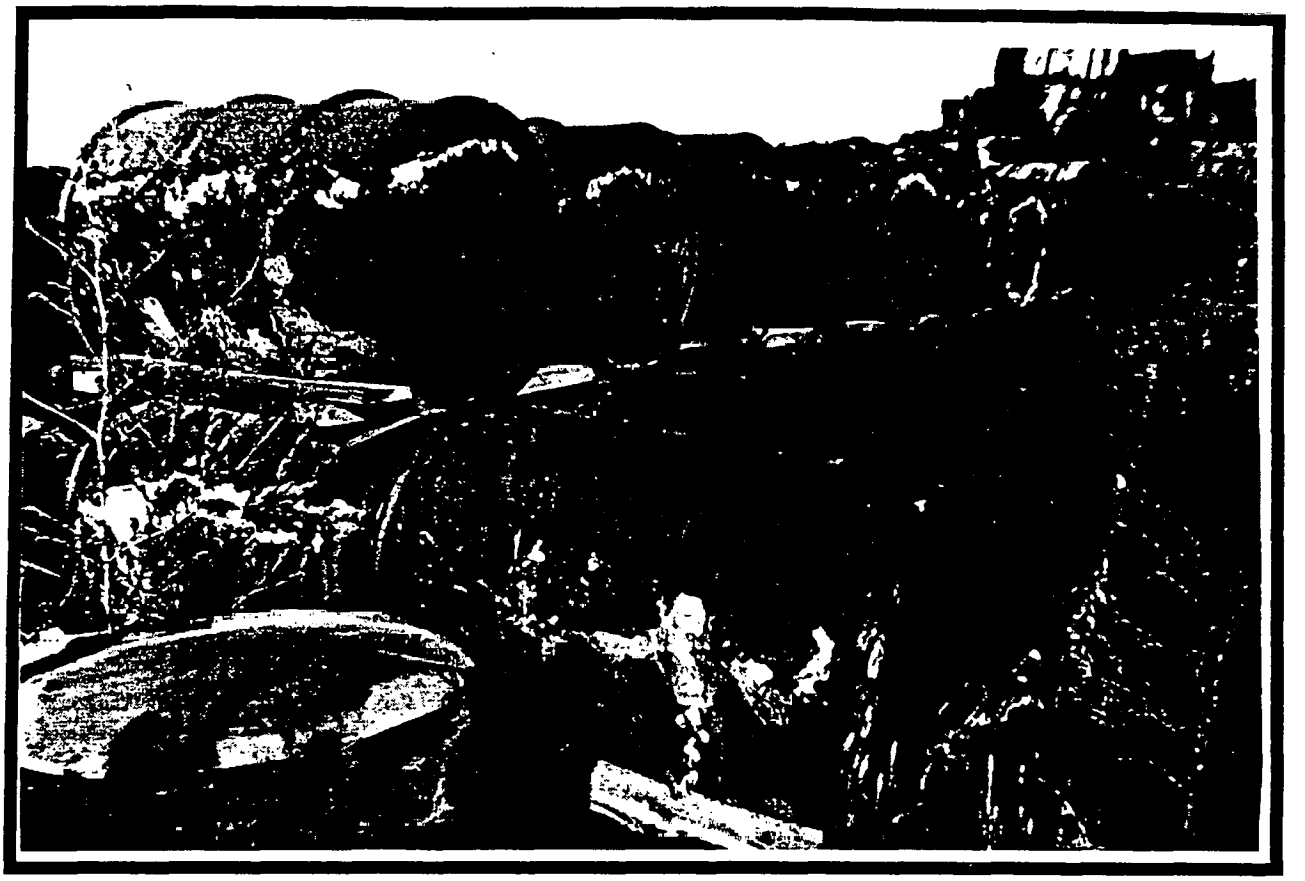


Photograph 1. Barrels filled with radioactive waste were piled end-on-end over most of the SLAPSS, this photograph possibly represents a later period evidence indicates that the first wastes were simply "dumped" in open piles. Photograph courtesy USDOE.

Over time, many of the barrels began to rust and decay, and the contents spilled onto the ground joining the residues that were already dumped there. Powerful photographs document this early period of radioactive waste storage in St. Louis. Today, even the most naive observer would recognize the inherent dangers associated with this manner of storage, but, at that time in

history, as little was known about the proper handling of radioactive waste as was known about the health effects of radiation.

The waste stored at the SLAPSS included process residue from the rich Belgian Congo ores and process residue from American ore. Most of the uranium had been extracted, but thorium, radium, and uranium residue still remained. Waste that was in 30- or 55-gallon drums joined the waste that had been dumped previously. Barrels were piled end-on-end over most of the 21.7 acre site.



Photograph 2. Within a short time, barrels filled with radioactive waste at the SLAPSS began rusting releasing their contents to the environment including Coldwater Creek, Photograph courtesy USDOE.

By the 1960s it became apparent that the SLAPSS had become a major radioactive waste storage problem. On November 5, 1965, a statement from *A Committee Report on Disposition of St. Louis Airport Storage Site* indicated that 121,050 tons of uranium residues remained.

In the early 1980s wastes were discovered eroding into Coldwater Creek from the SLAPSS. In November 1985, the Department of Energy constructed a gabion wall on the bank of the creek to prevent the further erosion of SLAPSS wastes into the creek. Subsequent

sampling found elevated concentrations of thorium in sediments in the creek for several miles downstream from the SLAPSS. These wastes were thought to come from the nearby Latty Avenue sites as well.

THE WASTE SPREADS - LATTY AVENUE

As early as the late 1950s the AEC had been planning to sell the radioactive waste materials associated with the St. Louis area. Between March 1962 and November 1964, the AEC made three attempts without success to sell the process residue and waste material at the SLAPSS. In 1966, residues, ore, and other materials at the SLAPSS site were sold to the Continental Mining and Milling Company by the AEC. Continental Mining and Milling began moving some of the waste residues to 9200 Latty Avenue, Hazelwood, Missouri. The Latty Avenue Site was located about one-half mile from the SLAPSS, and numerous properties along Berkeley and Hazelwood avenues were contaminated from the spillage of radioactive wastes during transport. On December 29, 1966, the Commercial Discount Corporation of Chicago took possession of the waste from Continental Mining and Milling. Commercial Discount was planning to transfer the waste to the Cotter Corporation processing facility in Canon City, Colorado.

In December 1969, Cotter Corporation purchased the remaining materials at the SLAPSS from the AEC. The AEC's invitation to bid listed the following residues for purchase: 74,000 tons of Belgian Congo pitchblende raffinate containing 113 tons of uranium; 32,500 tons of Colorado raffinate containing about 48 tons of uranium; and 8,700 tons of leached barium sulfate containing 7 tons of uranium. This was a total of 115,200 tons, or approximately 4,000 truckloads—an impressive amount of waste even by today's standards. In some unusual wording, the AEC stated that "everything must go." Also indicated in the wording was the unwillingness of the AEC to purchase uranium from the barium sulfate waste. This seemed to

indicate that the AEC was concerned about waste at the SLAPSS. From 1966 to 1969, much of the spillage had contaminated soils along the edges of the haul routes. Even today these locations have no signs posted to notify the public of the presence of radiological contamination and there is unrestricted public access to much of this area.

Fall of 1970 saw activity by the Cotter Corporation at the Latty Avenue site. Cotter began drying the process residue in August and then began shipping the material to its mill in Canon City, Colorado, at the rate of 400 tons per day. This continued until November 1970; all the residues were shipped except approximately 1,000 tons of Colorado raffinate and 8,700 tons of leached barium sulfate waste. The area is also referred to as the Hazelwood Interim Storage Site (HISS).

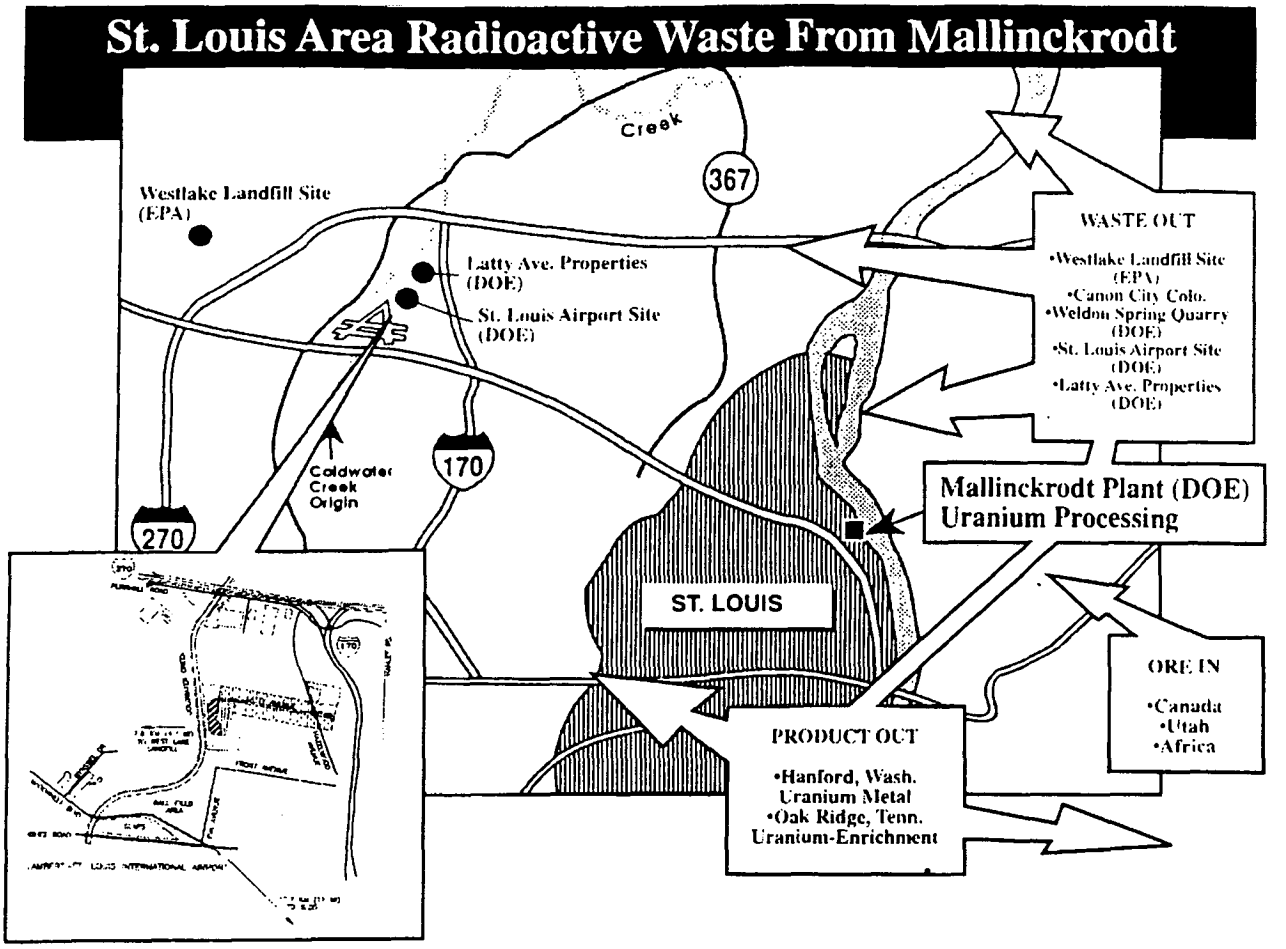


Figure 3. Map of the Greater St. Louis Area Showing Radioactive Waste Sites, 1993, MDNR.

WEST LAKE LANDFILL

From July to October of 1970, Cotter Corporation shipped 1,000 tons of wet Colorado raffinate from the Latty Avenue Site to Canon City, Colorado without drying. This left the 8,700 tons of barium sulfate waste. There was a much lower concentration of uranium in the barium sulfate (0.08%) when compared to the other residues (0.15%); there was probably little profit margin in shipping this waste material to Colorado.

In an effort to dispose of this material, it was diluted with an estimated 39,000 tons of topsoil and hauled to the West Lake Landfill in St. Louis County. Once again, spillage from open dump trucks, and subsequent contamination, occurred along the haul routes.

A May 17, 1974, AEC enforcement report on Cotter's disposal of the Latty Avenue waste material to the West Lake Landfill states that "...the licensee is clearly in violation of 10 CFR 20.301 in that he disposed of licensed material in an unauthorized manner ... We believe that the licensee should be cited for a violation of 10 CFR 20.301."

On November 1, 1974, the AEC sent a letter to Cotter officially informing the company that the West Lake Landfill disposal did not appear to be within the intent of the Commission's regulation. However, the AEC did not take enforcement action against Cotter. This was possibly due to misinformation that the waste was buried under one hundred feet of refuse. Actually, the waste was buried under only three feet of soil.

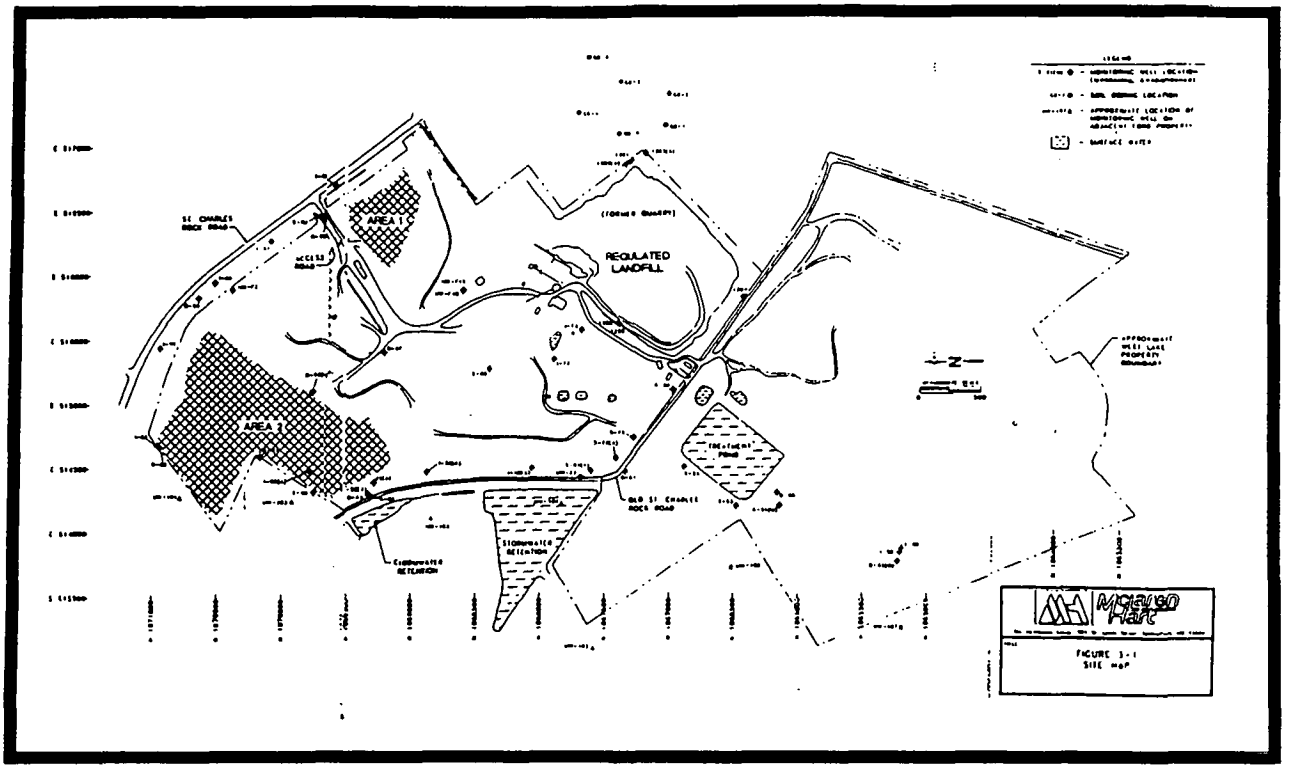


Figure 4. Map of the West Lake Landfill Showing Radioactive Contaminated Waste Areas, 1993, MDNR.

On June 2, 1976, the Missouri Department of Natural Resources (MDNR) asked the newly created Nuclear Regulatory Commission (NRC) to investigate and reassess the circumstances of how seven tons of uranium from the Latty Avenue site ended up in the West Lake Landfill. Within days, the NRC began an investigation, and, during a June 22 visit to the Cotter Corporation's office in Lakewood, Colorado, the NRC began to put together the story. The West Lake Landfill manager stated the next day that he was told the material was "clean fill dirt."

By June 1988, the NRC had a good idea of what was in the West Lake Landfill. The agency estimated that the contaminated soil was disposed of in two separate areas with 20,000

tons in "Area One" and 130,000 tons in "Area Two." The NRC also characterized the waste as containing radium, uranium, and thorium. The NRC staff found that there would be a significant radiological hazard in the future and concluded that measures must be taken to establish permanent control of the waste but stated that information pertaining to the site was inadequate. However, the NRC was silent regarding further action at the site.

The transfer of the Cotter wastes to the West Lake Landfill was the culmination of almost 40 years of careless management, inadequate containment, and careless transportation practices. The activities of this 40-year period resulted in the contamination of the banks of the Mississippi River, the river itself, numerous roadways and railroad right-of-ways, over 100 vicinity properties, a major urban stream (Coldwater Creek), and groundwater in the vicinity.

WELDON SPRING

In 1941, the U.S. Army acquired 17,000 acres near Weldon Spring in St. Charles County through the condemnation process. From 1941 to 1945, the Weldon Spring Ordnance Works (WSOW) facility was used for the production of trinitrotoluene (TNT) and dinitrotoluene (DNT) for the war effort. The explosives production facilities were dismantled at the end of the war in 1945. The facility was contaminated with production wastes from the manufacture of TNT and DNT.

In 1957, the AEC built, and Mallinckrodt operated, a new facility, the Weldon Spring Chemical Plant, on 220 acres in St. Charles County. This enabled them to use more efficient methods to prepare uranium. In the early 1960s some 5,000 truckloads of cleanup waste were hauled from the downtown Mallinckrodt facility to an abandoned rock quarry near the Weldon Spring munitions facility. In 1966, hundreds of drums of radioactive waste containing thorium residues from the Fernald Plant in Ohio were disposed of in the rock quarry. Mallinckrodt operated the Weldon Spring plant until it was closed in 1966.

Because of the Weldon Spring area's long and complex history and the shroud of secrecy under which the AEC operated, there has been much confusion in the mind of the public as to the source of the waste in the quarry.

A HISTORY OF REGULATION OF THE NUCLEAR INDUSTRY

When Roosevelt appointed the secret Advisory Committee on Uranium in 1939, the government's oversight of nuclear activities had begun.

The Manhattan Engineering District took on much of the role of oversight and management of the nation's nuclear interest in 1942.

Congress passed the Atomic Energy Act in 1946, which created a virtual monopoly on atomic energy and created a five-member Atomic Energy Commission to set policy and direction. In a classified AEC report issued on April 2, 1948, the AEC included the following observation. "The Atomic Energy Commission isolated its projects, built plants which are a marvel of engineering and guarded them with extraordinary efficiency. Their sins of emission—liquid, solid, or gaseous—were diluted and isolated to what was estimated as perfectly safe, but AEC is now entering a phase in which their operations in this regard will soon be public property and they will be accountable to public health—a very severe critic..." The report remained classified until 1988.

In 1954, Congress passed a revised Atomic Energy Act. The act permitted the widespread use of nuclear energy for peaceful purposes. J. Samuel Walker, in his book *A Short History of Nuclear Regulation 1946-1990*, stated, "The 1954 Act assigned the AEC three major roles: to continue its weapons program, to promote the private use of atomic energy for peaceful applications and to protect public health and safety from the hazards of commercial nuclear power. These functions were in many respects inseparable and incompatible, especially when combined in a single agency. The competing responsibilities and the precedence that the AEC

gave to its military and promotional duties gradually damaged the agency's credibility on regulatory issues and undermined public confidence in its safety program."

In January 1975, Congress eliminated the AEC and replaced it with two separate agencies. One was the Nuclear Regulatory Commission (NRC), which was charged with regulating the civilian uses of atomic energy, mainly commercial power plants. The other agency was the Energy Research and Development Administration (ERDA), whose duties included control of the nuclear weapons complexes.

Then, after only two years, the duties of ERDA were transferred to the newly created U.S. Department of Energy (DOE).

In 1986, Congress passed the Superfund Amendments and Reauthorization Act (SARA). This brought the cleanup of contaminated federal facilities under the oversight of the U.S. Environmental Protection Agency (EPA). The Federal Facilities Compliance Act of 1992 extended the EPA's and the states' authority to impose sanctions against the mismanagement of hazardous wastes at federal facilities.

This self-regulation, combined with a concern for maintaining national security, helps explain why the federal agencies failed to give the St. Louis Uranium Processing Plant and the spreading contamination the careful oversight such a major production facility deserved.

RECENT ACTIONS REGARDING RADIOACTIVE WASTE

Over the past 20 years, there has been a concerted effort by the U.S. DOE, U.S. EPA, the Missouri Department of Natural Resources, local governments, and interested citizens to find a solution to the federal SLUPP radioactive contamination.

The SLUPP resulted in more than 100 radioactively contaminated sites in the Greater St. Louis area. These vicinity properties were contaminated by spillage, wind-blown and water transport, and intentional deposition of the waste. Many of these sites are along busy thoroughfares, such as Latty Avenue, McDonnell Boulevard, and Hazelwood Avenue. Today, there is uncontrolled access to these areas. As of 1996, only 8 of the properties have been remediated.

In 1974, the DOE established the Formerly Used Sites Remedial Action Program (FUSRAP) to clean up sites not owned by DOE, but radiologically contaminated by past activities conducted under the auspices of the DOE or its predecessor agencies. Of the 33 sites in 13 states identified by DOE in 1992 as FUSRAP sites, the greater St. Louis area was the largest, both in terms of acreage impacted and in terms of quantity of radioactive waste materials.

In 1982, the DOE proposed that the waste at the SLAPSS and Latty Avenue sites be transported to the Weldon Spring Site and stored underground. Radioactive wastes from five other states, including Ohio, were also sent to the Weldon Springs site. The public was strongly opposed to this plan; a public hearing held at the Weldon Spring High School on August 12, 1982, was attended by an estimated 2,000 people who opposed the idea. The disposal of the material was becoming a major issue both locally and in Congress. On August 17, just five days after the public hearing, then U.S. Senator Thomas Eagleton introduced a bill to require DOE to

conduct a study to evaluate new options for disposing of the wastes. In 1984, Congress passed legislation that directed the DOE to acquire the SLAPSS from the City of St. Louis for disposal of the SLAPSS and Latty Avenue waste materials.

A Special Committee on Radioactive Waste of the St. Louis Board of Aldermen issued a report on July 7, 1988, regarding the radioactive waste in the St. Louis area. The report urged the Missouri Congressional delegation to "introduce legislation to direct the DOE to find an environmentally sound disposal site away from a major population center for these St. Louis wastes."

The Missouri Department of Natural Resources in the mid- and late-1980s, petitioned the U.S. EPA to place the sites on the Superfund National Priority List (NPL), a list of the most severely contaminated sites in the United States. In October, 1989, EPA placed the SLAPSS and Latty Avenue properties on the NPL; EPA listed the West Lake Landfill property on the NPL in 1990. The downtown Mallinckrodt site is not included on the NPL.

In 1992, the EPA initiated Superfund enforcement actions against several Potentially Responsible Parties (PRPs) at the West Lake Landfill site. These PRPs included DOE, Cotter Corporation, Laidlaw Waste Systems, and Rock Road Industries. As a response, DOE claimed that it was not a PRP since the radioactive materials in the West Lake Landfill were sold for their commercial value and not sold as a mechanism to manage radioactive waste.

The very next day, May 13, 1992, an EPA consultant's report took the opposite position. Jeb Bryan, from Metcalf and Eddy, Inc., pointed out that the AEC's instructions to bidders implied that the barium sulfate cake was actually waste. The "Instructions to Bidders" included three things that indicated that DOE was aware that the materials were wastes: the pitchblende

raffinate had value, but the barium sulfate cake did not have any value; AEC itself would not purchase any uranium from the processing of the residues (implying that the uranium was not economically recoverable and that there was plenty of other uranium available); and that there would be a $50,000 performance bond for the bidder to remove all residues from the site (again, implying that the barium sulfate has no value). Based on this report, the EPA continued to assert that DOE was at least partially responsible for the wastes at the West Lake Landfill, and, in 1993, EPA issued a consent order that required a Remedial Investigation/Feasibility Study (RI/FS) with the PRPs at the landfill. The DOE signed the consent order but continued to deny any liability for the West Lake Landfill site.

In 1994, a special citizens committee, the St. Louis Site Remediation Task Force, was appointed by the DOE to find a solution to the radioactive waste contamination of the St. Louis area.

Appendix A

Chronology

of

St. Louis Uranium Processing Plant Radioactive Waste Sites

Chronology

	Date	Event	Source
1	1789	German chemist Martin Klaproth discovers uranium in oxide form in pitchblende.	Alexander Hellemans and Bryan Bunch, *The Timetables of Science,* Simon and Schuster, 1988, p. 238
2	1896	French physicist Henri Becquerel discovers that uranyl potassium sulfate, a uranium salt, emits energetic, penetrating radiation.	Rhodes, Richard, *The Making of the Atomic Bomb*, 1986, p. 41-42
3	1898	French scientists Marie and Pierre Curie discover that thorium gives off "uranium rays," which Marie renames *radioactivity.*	*The Timetables of Science,* 1988, p. 391
4	1938- Jan 1939	German physicist Otto Hahn and Austrian physicist Lise Meitner are the first to split the atom of uranium, opening up the possibility of a chain reaction and atomic bombs. Meitner and Austrian physicist Otto Robert Frisch advance the theory that uranium, when bombarded by neutrons, breaks into smaller atoms; they use the word *fission* for this process.	*The Timetables of Science,* 1988, p. 477-8
5	Aug 2, 1939	Albert Einstein writes letter to President Franklin D. Roosevelt: ". . . In the course of the last four months it has been made probable . . . that it may be possible to set up a nuclear chain reaction in a large mass of uranium . . . This new phenomenon would also lead to the construction of bombs . . ." Einstein also points out that ". . . the United States has only very poor ores of uranium in moderate quantities. . . the most important source of uranium is Belgian Congo."	Einstein, Albert, Letter to President Franklin Roosevelt, August 2, 1993
6	Sep 1, 1939	Hitler invades Poland; World War II begins.	Rhodes, Richard, *The Making of the Atomic Bomb*, 1986, p. 309

7	Oct 1939	At the urging of Albert Einstein and other atomic scientists, President Roosevelt asks for action on the uranium issue. A secret Advisory Committee on Uranium is set up to investigate the feasibility of developing an atomic bomb, fearing that Germans are already ahead of the Allies in developing such a weapon.	Rhodes, *The Making of the Atomic Bomb*, 1986, pp. 314, 379
8	1940	1,250 tons of extraordinarily rich uranium ores (65% uranium oxide), or "pitchblende," are shipped by the Belgians from mines in Belgian Congo to Staten Island, NY, to remove it beyond German reach.	Rhodes , p 427
9	1941	U.S. Army acquires by condemnation 17,000 acres in St. Charles County for TNT and DNT production. Production continues until World War II ends in 1945. The production facilities are dismantled in 1945 but the Weldon Spring Ordnance Works remains contaminated with TNT/DNT production residues.	
10	Dec 8, 1941	U.S. declares war on Japan and Germany	Rhodes, p. 392
11	Apr 17, 1942	Responding to a request from Washington University atomic physicist Arthur Holly Compton, Edward Mallinckrodt Jr. agrees to refine uranium from the Belgian Congo ores at Mallinckrodt Chemical Works in north St. Louis. Mallinckrodt is chosen because of its experience in using a dangerous ether extraction process. The uranium is to be used for experiments to test the feasibility of a sustained nuclear reaction.	*St. Louis Post-Dispatch* (SLPD) 02-12-89
12	Apr 24, 1942	Mallinckrodt begins experiments using an ether extraction process to refine uranium ore. "Mallinckrodt succeeded after only 50 days, and went on to produce all the uranium used in the world's first nuclear chain reaction below Stagg Field at the University of Chicago."	*Fuel for the Atomic Age: Completion Report On St. Louis-Area Uranium Processing Operations, 1942-1967*, (09-30-67) p.20 Pryor, Roger, *A Mountain of Waste 50 Years High*, (04-25-92)

13	May-Nov 42	Using ether extraction process Mallinckrodt refines the 40 tons of uranium needed for the first sustained and controlled nuclear reaction. Uranium refining will continue at this site until 1957.	SLPD 02-12-89
14	Dec 2, 1942	The first sustained and controlled nuclear reaction is achieved by the Manhattan Engineering District (MED) in the "Fermi pile" at the Univ. Of Chicago. "On December 2, 1942, in the early days of World War II, the atomic age was born: the first self-sustaining, nuclear chain reaction was achieved in what had been a squash court under the West Stands of Stagg Field at the University of Chicago. . . . One of the most important parts of the hush-hush scientific industrial complex was the uranium project at the Mallinckrodt Chemical Works plant in St. Louis, Missouri. Its work was a vital link in the chain of activities which led to the birth, and subsequent development and advancement of the atomic age . . All of the uranium used in the (Chicago) pile was in the form of compressed UO_2 produced by Mallinckrodt or uranium metal produced by others using intermediate, purified uranium compounds produced by Mallinckrodt."	*Fuel for the Atomic Age: Completion Report On St. Louis-Area Uranium Processing Operations, 1942-1967*, (09-30-67) p. 2 by Fleishmann Hilliard, Inc., St. Louis, MO *Ibid.*, p.10
15	1942-1945	Uranium refining processes ". . . involve potential exposure of the employees to alpha-emitting dusts and, in the case of high-grade fuels, to radon and gamma radiation. . . the plants hastily constructed during World War II had insufficient control over dusts contained in exhaust air, and relatively large amounts of uranium were discharged to the outside atmosphere. . . The kinds of wastes produced by the refineries depend on the type of feed that is processed. During World War II and for a few years thereafter, when high-grade ores were processed that contained as much as 100mCi ^{226}Ra per ton of ore, some of the sludges contained as much as 1 Ci ^{226}Ra per ton."	Eisenbud, Merril, *Environmental Radioactivity From Natural, Industrial, and Military Sources*, Third Edition (1987) p. 181

16	1942-45	Mallinckrodt Chemical Works refines uranium for making first atomic bombs under contract with MED. Mallinckrodt continued to refine uranium at its Destrehan St. Plant in north St. Louis until 1957. Then the AEC built a new uranium processing facility (known as the "Weldon Spring Chemical Plant" or "WSCP") at the site of the former Weldon Spring Ordnance Works in St. Charles County. Mallinckrodt was hired as the contractor to operate the WSCP until it was closed in 1966.	
17	1942-1957	"During the 25 years that it was involved in uranium production, Mallinckrodt made numerous contributions to uranium-processing technology. . . Mallinckrodt has played an important part in uranium metal technology in the United States since the first serious efforts were directed towards the development of a commercial production process. . . "	*Fuel for the Atomic Age: Completion Report On St. Louis-Area Uranium Processing Operations, 1942-1967*, (09-30-67) p. 6, 8
18	1943-1947	"During years 1943-1947 several plants, in addition to Mallinckrodt, produced UO_3, UF_4 and or U metal. Production contracts were based on competitive bids. Mallinckrodt was bidder and thus operated the only plant for these products until the Fernald, Ohio plant was built (in 1953) to meet increased capacity needs."	*Fuel for the Atomic Age: Completion Report On St. Louis-Area Uranium Processing Operations, 1942-1967*, (09-30-67) p. 158-9.
19	Jul 16, 1945	First atomic bomb is tested at White Sands Test Range, Alamogordo, New Mexico.	
20	Aug 6 & 9, 1945	Atomic bombs detonated at Hiroshima and Nagasaki, Japan.	
21	Mar 2, 1946	MED obtains consent to use 21.7 acres near the St. Louis Airport for storage of process wastes and residues from the Mallinckrodt Plant. This became known as the St. Louis Airport Storage Site (SLAPSS).	Airport Committee Report (11-05-65) Exhibit 5, p. 1

22	1946	Congress passes the Atomic Energy Act in September of 1946 which creates a virtual government monopoly of atomic energy and creates the five-member Atomic Energy Commission (AEC) to manage it. "The Atomic Energy Commission isolated its projects, built plants which are a marvel of engineering and guarded them with extraordinary efficiency. Their sins of emission-liquid, solid, or gaseous-were diluted and isolated to what was estimated as perfectly safe, but AEC is now entering a phase in which their operations in this regard will soon be public property and they will be accountable to public health-a very severe critic. . . "	NRC, A Short History of Nuclear Regulation 1946-1990 (Jan, 1993) p.1 USAEC, *Report of the Safety and Industrial Health Board*, (04-02-48) p. 9 [In DOE, *Closing the Circle on the Splitting of the Atom*, Jan 1995, p 8.] This AEC report was classified until 1988.
23	1947	Mont Mason, Director of Safety at Mallinckrodt, becomes concerned about uranium workers' health.	SLPD 02-12-89
24	Jan 3, 1947	MED acquires the SLAPSS by condemnation.	Airport Committee Report (11-05-65) Exhibit 5, p. 1 and DOE Background (Jan 85)
25	1946-53 1953-67	MED & AEC operate SLAPSS to store wastes and residues (mostly from Mallinckrodt). Mallinckrodt operates SLAPSS under contract with AEC. The wastes at the SLAPSS include pitchblende raffinate (AM-7), radium bearing wastes (K-65), barium cake residue (AJ-4), Colorado raffinate residues (AM-10), and miscellaneous residues that include interim plant tailings (C-701) from the Mallinckrodt Plant on Destrehan Street, and Japanese uranium-containing sand and Vitro residues from the AEC facility in Middlesex, New Jersey.	WESTON: Historical Summary - FUSRAP Sites - St. Louis (04-01-88) p. 3
26	1947	MED transfers SLAPSS to the AEC.	DOE Background (Jan 85)
27	April 2, 1948	The NRC generated the *Report of the Safety and Industrial Health Board.*	

28	1948-49	Highly radioactive radium bearing wastes (K-65) are transferred from SLAPSS to Lake Ontario, New York and then to Fernald, OH.	DOE, *History of Material Storage at the St. Louis Airport Storage Site,* March 1986, p. 1
29	1948-50	AEC finances cleanup at Mallinckrodt Plant.	SLPD (Feb 13, 1989)
30	1951-53	AEC begins production of uranium metal at a new uranium refining plant at Fernald, Ohio, near Cincinnati. Uranium refining continued at Fernald until 1989.	History Division, DOE, *Environmental Restoration and Waste Management, Site History: Fernald*, Jan 1993, p. 6
31	1954	60 tons of captured Japanese uranium wastes brought to SLAPSS.	DOE, *History of Material Storage at the St. Louis Airport Storage Site,* March 1986, Table 1.
32	1954	Atomic Energy Act of 1954, as amended, permits wide use of atomic energy for peaceful purposes. "The 1954 Act assigned the AEC three major roles: to continue its weapons program, to promote the private use of atomic energy for peaceful applications, and to protect public health and safety from the hazards of commercial nuclear power. These functions were in many respects inseparable and incompatible, especially when combined in a single agency. The competing responsibilities and the precedence that the AEC gave to its military and promotional duties gradually damaged the agency's credibility on regulatory issues and undermined public confidence in its safety program."	J. Samuel Walker, NRC, *A Short History of Nuclear Regulation 1946-1990* (Jan, 1993) p.2
33	1957	AEC builds a new chemical (uranium processing) plant on 220 acres of the former Weldon Spring Ordnance Works. The AEC contracts with Mallinckrodt to operate the plant and the St. Louis uranium processing operations are transferred there. (The Mallinckrodt St. Louis plant remains contaminated with uranium, thorium and radium by today's standards.)	SLPD 02-14-89
34	1957-62	AEC finances cleanup at downtown Mallinckrodt Plant.	SLPD 02-12-89

35	late 1950s	AEC begins planning the sale of a large quantity of process residual materials and wastes from the production of uranium in the St. Louis area.	USDOE, *Historical Narrative concerning Radioactivity in the West Lake Landfill*, attachment to 05-12-92 letter from James Fiore, DOE to David Wagoner, EPA,
36	Jun 10, 1960	AEC offers uranium processing residues and wastes at SLAPSS for sale.	AEC, *Request for proposals for the Purchase and Removal of Uranium contaminated Residues*, Jun 10, 1960
37	1962	AEC returns downtown uranium complex to Mallinckrodt for unrestricted use.	SLPD 02-12-89
38	Early 1960s	5,000 truckloads of cleanup waste are hauled from Mallinckrodt to the quarry at Weldon Spring site.	SLPD 02-12-89
39	Mar 1962-Nov 1964	AEC makes three attempts to sell the same SLAPSS residues.	Jeb Bryan, Metcalf & Eddy, Letter to Diana Newman, USEPA, (05-13-92) p. 2
40	Aug 8, 1965	The AEC establishes the Airport Committee to formulate a plan to: (1) remove the residues and wastes from the SLAPSS to Weldon Spring; (2) clean up the SLAPSS; and, (3) dispose of the airport site after the clean up. (The City of St. Louis and McDonnell Aircraft want to acquire the site for a parking lot.)	AEC, *Committee Report on Disposition of St. Louis Airport Storage Site, (11-05-65) p.* 1.
41	Nov 5, 1965	AEC's *Committee Report on Disposition of St. Louis Airport Storage Site* indicates that 121,050 tons of uranium residues and wastes remain at the site. The Committee also concludes that the possibility of sale of the material is "remote." The committee also recommends that AEC remove the waste and, after a minor cleanup, dispose of the site on a restricted basis.	AEC, *Committee Report on Disposition of St. Louis Airport Storage Site, (11-05-65) pp. 2 and 14.* WESTON: Historical Summary - FUSRAP Sites - St. Louis (04-01-88) p. 4

42	Feb 1966	Continental Mining and Milling Co. purchases uranium residues and process wastes at the SLAPSS site from the AEC in early 1966. The Bill of Sale indicates that the wastes contain more than 0.05% uranium and therefore constitute source material subject to AEC licensing requirements. Some of these materials are moved from the SLAPSS to 9200 Latty Avenue during 1966 and 1967 under AEC License No. SMA-862. AEC also requires a $50,000 performance bond guaranteeing that all residues and wastes will be removed from a designated area of the SLAPSS site.	WESTON: Historical Summary - FUSRAP Sites - St. Louis (04-01-88) p. 4 US NRC, Region III, IE *Investigation Report No. 76-01* (01-05-77) p. 5
43	1966	Radioactive waste containing thorium from Fernald, Ohio, are disposed of in the abandoned rock quarry at the Weldon Spring complex.	Hercules, Inc. for M.K. Ferguson, "Explosive Hazard Review for the Weldon Spring Site Remedial Action Project Quarry Excavation," June 1990.
44	Dec 29, 1966	The Commercial Discount Corporation of Chicago receives AEC license No. SMC-907 allowing them to take physical possession of the process residues and waste, removal of moisture and shipment to the Cotter Corporation facilities in Canon City, Colorado.	US NRC, Region III, IE *Investigation Report No. 76-01* (01-05-77) p. 5
45	1966-69	When residues, ores and other materials (at SLAPSS) are hauled to a site on Latty Avenue, numerous properties along the haul roads become contaminated.	St. Louis County Health Dept. *Synopsis* on SLAPSS and DOE, FUSRAP St. Louis Site brochure.
46	1967	AEC consolidates its uranium refining at Fernald, Ohio, near Cincinnati.	
47	1967	AEC authorizes use of SLAPSS by City of St. Louis.	DOE Background (Jan 85)

48	Dec 1969	The Cotter Corporation purchases the remaining source material. The AEC's invitation to bid lists the following residues for purchase: 74,000 tons of Belgian Congo pitchblende raffinate containing 113 tons of uranium; 32,500 tons of Colorado raffinate containing about 48 tons of uranium; and 8,700 tons of leached barium sulfate containing 7 tons of uranium.	US NRC, Region III, IE Investigation Report No. 76-01 (01-05-77) p. 5 WESTON: Historical Summary - FUSRAP Sites - St. Louis (04-01-88) p. 4
49	Aug-Nov 1970	The Cotter Corporation begins drying operations on the Latty Avenue Site prior to the shipment of their initial purchase of the residues from the site under AEC License No. SUB-1072 (or 1022?). They then ship them to their mill in Canon City, Colorado at the rate of 400 dry tons per day. This operation is performed for Cotter by B&K Construction Co. and continues until about November 1970. During this period, all of the residues are shipped to Canon City with the exception of approximately 10,000 tons of Colorado raffinate and 8,700 tons of leached barium sulfate waste.	US NRC, Region III, IE Investigation Report No. 76-01 (01-05-77) p. 5-6 WESTON: Historical Summary - FUSRAP Sites - St. Louis (04-01-88) p. 4
50	Jul-Oct 1973	Cotter ships 1,000 tons of Colorado raffinate to Canon City without drying, and the leached barium sulfate waste, along with 38-39,000 tons of topsoil, is disposed of in West Lake Landfill in St. Louis County. This material was mixed with approximately 5 times as much topsoil. "The declared purpose of the mixing of the uranium bearing residues with top soil was to disperse and dilute the uranium bearing residues . . . The resulting mixture contained, in the opinion of the licensee, an unlicensable percentage of uranium (less than 0.05%)." In 1974 the AEC would decide that this was "clearly in violation of federal regulations" but no enforcement action was ever taken against Cotter. (See May 17, 1974, entry below.)	US NRC, Region III, IE Investigation Report No. 76-01 (01-05-77) p. 6 USDOE, *Circumstances surrounding the radioactive contamination, West Lake Landfill Site, St. Louis County, Missouri*, p.8, Attachment to 05-12-92 letter from James Fiore, DOE to David Wagoner, EPA.

51	May 15, 1973	SLAPSS transfered to City of St. Louis by quitclaim deed.	DOE/ORO, Oak Ridge TN, *A Compilation of Background Information Available to The U.S. Department of Energy on a 21.7-Acre Tact of City of St. Louis-Owned Airport Land Which May be Conveyed to DOE Pursuant to Public Law 98-360*, (Jan 85) p. 3
52	1974	AEC establishes Formerly Utilized Sites Remedial Action Program (FUSRAP) for cleanup of sites not owned by DOE but contaminated from past activities involving radioactive materials. The Mallinckrodt Plant (also known as the "St. Louis Downtown Site"), SLAPSS, and Latty Avenue sites are eventually placed in the FUSRAP. West Lake Landfill is never placed in FUSRAP.	DOE FUSRAP Brochure (undated)
53	Apr 1974	During an inspection of the Latty Avenue site, the AEC, Region III, learns of the disposal of the Latty waste at West Lake Landfill.	US NRC, Region III, IE Investigation Report No. 76-01 (01-05-77) p. 4
54	May 17, 1974	An AEC enforcement report on Cotter's disposal of the Latty waste at West Lake Landfill states that ". . . the licensee is clearly in violation of 10 CFR 20.301 in that he disposed of licensed material in an unauthorized manner. . . We believe that the licensee should be cited for a violation of 10 CFR 20.301." At this time the Cotter Corporation and the AEC mistakenly believed that the residues were buried under 100 feet of "refuse".	Letter from James Allan, Chief, Radiological and Environmental Protection Branch, AEC (05-17-74)
55	1974	The Missouri Department of Natural Resources (MDNR) is created in a re-organization of state government.	

56	Nov 1, 1974	An AEC letter to Cotter Corporation notifies them that the disposal of the Latty material at West Lake Landfill does not appear to be within the intent of the Commission's regulation, 10 CFR Part 40, concerning alteration (dilution) of (radioactive) source material to obtain a mixture no longer subject to licensing. However, the AEC does not take enforcement action against Cotter, partly because of misinformation that the radioactive waste is unrecoverable. AEC mistakenly believes that the radioactive waste is buried under 100 feet of municipal waste. Actually the waste is only buried under 3 feet of soil.	US NRC, Region III, IE Investigation Report No. 76-01 (01-05-77) p. 9 and Exhibit E
57	Jan 1975	The AEC is replaced by two new federal agencies. One is the Nuclear Regulatory Commission (NRC) which is charged with regulating the civilian uses of atomic energy (mainly commercial nuclear power plants). The other is the Energy Research and Development Administration (ERDA), whose duties include the control of the nuclear weapons complex. [In 1977 ERDA's duties are transferred to the newly created Department of Energy (DOE).] [Note: This split means that ERDA/DOE is self-regulating until the passage of the Superfund Amendments and Reauthorization Act in 1986, which will bring federal facility cleanups under EPA oversight. The Federal Facilities Compliance Act of 1992 extends EPA's and the states' authority to impose sanctions against mismanagement of hazardous wastes at federal facilities. This self-regulation combined with military secrecy is important for the manner in which the AEC and DOE handle the cleanup of the St. Louis sites.]	Walker, Samuel J., *A Short History of Nuclear Regulation 1946-1990*, U.S. Nuclear Regulatory Commission, (Jan, 1993) p.45 DOE, *Closing the Circle on the Splitting of the Atom*, Jan 1995, p. 4 League of Women Voters Education Fund, *The Nuclear Waste Primer*, 1993, p. 102-3
58	June 2, 1976	MDNR notifies the NRC that articles have appeared in the St. Louis Post Dispatch indicating that seven tons of uranium from the Latty Avenue Site were dumped at the West Lake Landfill in St. Louis County. MDNR asks the NRC to investigate and re-assess the disposal of the Latty Avenue waste at West Lake Landfill.	Ken Karch, MDNR letter to James Keppler of NRC Region III.

59	Jun 22, 1976	NRC, in a visit to Cotter Corporation, Lakewood, CO, learns the circumstances of the disposal of the Latty wastes at West Lake Landfill.	US NRC, Region III, IE Investigation Report No. 76-01 (01-05-77) p. 6
60	Jun 23, 1976	NRC, in a visit to West Lake Landfill, learns that the landfill manager understood that the material hauled from Latty was "clean fill dirt."	US NRC, Region III, IE Investigation Report No. 76-01 (01-05-77) p. 7
61	1977	ERDA becomes DOE.	
62	1977	Oak Ridge National Laboratory performs radiological survey for DOE at the Mallinckrodt Plant. The results indicate the presence of elevated radioactivity levels in some areas of the site.	*FUSRAP CHOICES: Exploring Remedial Action Alternatives Workshop*, Jan 22-23, 1992, p. 68
63	Mar 28, 1979	A nuclear accident at the Three Mile Island nuclear power plant, Harrisburg, PA, heightens public concern about radioactive materials. The accident also damages the credibility of the nuclear industry and the federal regulatory agencies. The NRC re-examines the adequacy of its safety requirements and adopts new regulations.	Walker, Samuel J., *A Short History of Nuclear Regulation 1946-1990*, U.S. Nuclear Regulatory Commission, (Jan, 1993) p. 46-48.
64	July 1979	City of St. Louis proposes a police cadet driver training course at SLAPSS.	WESTON, *Environmental Impact Analysis of Alternative Actions of the Former Airport Site of the Atomic Energy Commission*, July 1979.
65	1981	An AEC report states that, based on the 1977 survey, Mallinckrodt plant is still contaminated.	SLPD 02-12-89
66	1982	DOE proposes disposing of SLAPSS/Latty waste at the Weldon Spring Site.	*Congressional Record, Aug 17,1982*
67	Aug 12, 1982	An estimated 2,000 people attend a hearing in St. Charles County to protest DOE's plan to dispose of SLAPSS/Latty Avenue waste at the Weldon Spring Site.	*Congressional Record, Aug 17,1982*
68	Aug 17, 1982	Sen. Eagleton introduces bill to authorize DOE to reacquire the SLAPSS and to study options for disposing of the SLAPSS/Latty wastes.	*Congressional Record, Aug 17,1982*

69	1984	Congress (PL 98-360) directs DOE to reacquire SLAPSS from the City of St. Louis for disposal of SLAPSS, Latty and Vicinity property wastes.	DOE Briefing to Missouri Congressional Staff on SLAPSS (2-17-87)
70	1985	In the early 1980s waste is found to be eroding into Coldwater Creek from the SLAPSS. In 1985 DOE constructs a gabion wall on the bank of Coldwater Creek to prevent further erosion of SLAPSS waste into the creek. Subsequent sampling finds elevated concentrations of Thorium-230 in sediments in the creek along several miles downstream from SLAPSS.	
71	Aug 1985	Bechtel National, Inc. develops for DOE design options for disposal of SLAPSS/Latty wastes at SLAPSS.	Bechtel National, Inc., *St. Louis Airport Storage Site (SLAPSS), Summary of Design Concepts*, Aug 1985, Oak Ridge, TN.
72	Mar 1986	DOE revises history of material storage at SLAPSS.	DOE, *History of Material Storage at the St. Louis Airport Storage Site,* March 1986.
73	Jun 1988	NRC releases summary report on West Lake Landfill. The contaminated soil is in two areas: 20,000 tons in Area 1 and 130,000 tons in Area 2. NRC estimates that there are 14 Ci of Ra-226, 3 Ci of U-238, 3 Ci of U-234, and 1400 Ci of Th-230 in the landfill. The NRC staff finds that there will be a significant increase in the radiological hazard at the West Lake Landfill in the future and concludes that measures must be taken to establish permanent control of the waste, and that information on the site is inadequate. However, NRC does not indicate that it will take any further action at the site.	NRC, *Radioactive Material in the West Lake Landfill, (NUREG-1308)* June 1988 pp.12 and 15.

74	Jul 7, 1988	Special Committee on Radioactive Waste of the St. Louis Board of Aldermen issues report which ". . . urges the Missouri Congressional delegation to introduce legislation to direct the DOE to find an environmentally sound disposal site away from a major population center for these St. Louis wastes. . ." The City of St. Louis continues to refuse to transfer the property back to the DOE as authorized under PL 98-360.	*Report of the Special Committee on Radioactive Waste of the St. Louis Board of Aldermen, July 7, 1988*, p.1.
75	Oct 25, 1988	Since both DOE and NRC have both refused to take action at the West Lake Landfill site, MDNR requests that EPA place the site on the Superfund National Priority List (NPL).	*Letter from William Ford, MDNR to David Wagoner, EPA, Region VII, Oct 25,1988.*
76	Dec 14, 1988	The NRC's *Report of the Safety and Industrial Health Board,* dated April 2, 1948, is declassified.	DOE, *Closing the Circle on the Splitting of the Atom*, Jan 1995, p. 8.
77	Oct 1989	EPA places SLAPSS and Latty on NPL.	DOE FUSRAP St. Louis Site brochure.
78	1990	EPA places West Lake Landfill on the NPL.	
79	1992	EPA initiates Superfund enforcement action against the potentially responsible parties (PRPs) at West Lake Landfill: DOE, Cotter Corp., Laidlaw Waste Systems, and Rock Road Industries.	
80	May 12, 1992	DOE claims that it has no responsibility for wastes at West Lake Landfill because they were sold for their commercial value and not as a mechanism for disposal.	Letter from Jim Fiore, USDOE to David Wagoner, USEPA, (05-12-92) p. 1.

81	May 13, 1992	A report to EPA concludes that AEC's "Instructions to Bidders" used in the attempts to sell the Latty residues implied that the 8700 tons of barium sulfate cake were actually wastes. The instructions: (1) pointed to the value inherent in the pitchblende raffinate but did not represent the barium sulfate cake to have value itself. (2) advised that AEC would not purchase any uranium from processing of the residues; presumably this reflected the market condition for the uranium at the time and can be taken to indicate that the uranium content of 0.1% would not be economically recoverable. (3) required a $50,000 performance bond guaranteeing that the bidder would remove all the residues from the site. This implied that barium sulfate waste might have no value and that the bidder might leave them on site. Based on these findings EPA continues to hold DOE at least partially liable for the West Lake wastes.	Jeb Bryan, Metcalf & Eddy, Letter to Diana Newman, USEPA, (05-13-92) p. 2.
82	1993	EPA issues a consent order against the PRPs at West Lake Landfill requiring them to conduct a Remedial Investigation/Feasibility Study on the site. DOE signs the consent order on March 30, 1993 but continues to deny liability for the West Lake wastes.	USEPA, *Administrative Order on Consent for Remedial Investigation/ Feasibility Study.*
83	1994	DOE establishes the St. Louis Site Remediation Task Force.	

Appendix B

Albert Einstein's

Letter to President Franklin Roosevelt,

August 2, 1939

Einstein's letter to Roosevelt

Albert Einstein
Old Grove Road
Nassau Point
Peconic, Long Island

August 2nd, 1939

F. D. Roosevelt
President of the United States.
White House
Washington, D. C.

Sir:

Some recent work by E.Fermi and L. Szilard. which has been communicated to me in a manuscript. leads me to expect that the element uranium may be turned into a new and important source of energy in the immediate future. Certain aspects of this situation which has arisen seem to call for watchfulness and. if necessary. quick action on the part of the Administration. I believe therefore that it is my duty to bring to your attention the following facts and recommendations:

In the course of the last four months it has been made probable - through the work of Joliot in France as well as Fermi and Szilard in America - that it may become possible to set up a nuclear chain reaction in a large mass of uranium.by which vast amounts of power and large quantities of new radium-like elements would be generated. Now it appears almost certain that this could be achieved in the immediate future.

This new phenomena would also lead to the construction of bombs, and it is conceivable - though much less certain - that extremely powerful bombs of a new type may thus be constructed. A single bomb of this type, carried by boat and exploded in a port, might very well destroy the whole port together with some of the surrounding territory. However, such bombs might very well prove to be too heavy for transportation by air.

The United States has only very poor ores of uranium in moderate quantities. There is some good ore in Canada and the former Czechoslovakia, while the most important source of uranium is Belgian Congo

In view of this situation you may think it desirable to have some permanent contact maintained between the administration and the group of physicists working on chain reactions in America. One possible way of achieving this might be for you to entrust with this task a person who has your confidence and who could perhaps serve in an inofficial capacity. His task might comprise the following:

a) to approach Government Departments, keep them informed of the further development, and put forward recommendations for Government action, giving particular attention to the problem of securing a supply of uranium or for the United States;

b) to speed up the experimental work,which is at present being carried on within the limits of the budgets of University Laboratories, by providing funds, if such funds be required, through his contacts with private persons who are willing to make contributions for this cause, and perhaps also by obtaining the co-operation of industrial laboratories which have the necessary equipment.

I understand that Germany has actually stopped the sale of uranium from the Czechoslovakian mines which she has taken over. That she should have taken such an early action might perhaps be understood on the ground that the son of the German Under-Secretary of State, von Weizsacker, is attached to the Kaiser-Wilhelm-Institute in Berlin where some of the American work on uranium is now being repeated.

Yours very truly,

[Einstein's Signature]

(Albert Einstein)

Appendix C

Contract between

Mallinckrodt Chemical Company

and

Manhattan Engineering District

This Document is

Currently

Being

Requested

Appendix D

Excerpt from

Report of the Safety and Industrial Health Board

April 2, 1948, page 9

(Classified until December 14, 1988)

(From: *DOE. Closing the Circle on the Splitting of the Atom: The Environmental Legacy of Nuclear Weapons Production in the United States and What the Department of Energy is Doing About It.* January 1995, page 8.)

UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON, D.C.

REPORT OF THE SAFETY AND INDUSTRIAL HEALTH ADVISORY BOARD

April 2, 1948

The Atomic Energy Commission isolated its projects, built plants which are a marvel of engineering and guarded them with extraordinary efficiency. Their sins of emission—liquid, solid, or gaseous—were diluted and isolated to what was estimated as perfectly safe, but AEC is now entering a phase in which their operations in this regard will soon be public property and they will be accountable to public health—a very severe critic...

In the haste to produce atomic bombs during the war certain risks may have been taken in research, production, testing, transportation and waste disposal with the understanding that subsequently more effective control measures would ameliorate these risks and lessen the hazardous conditions formerly created...

The ultimate disposal of contaminated waste—sub-surface, surface and air-borne—needs much more thorough study. Even the simplest of such data—recorded periodic measurements of stream pollution below the plants—are almost wholly lacking. Even with such records, present knowledge of radiation and chemically toxic effects on animal and vegetable life is so limited that water supply inlets below plant disposal outlets cannot be unqualifiedly recommended. The disposal of contaminated waste in present quantities and by present methods (in tanks or burial grounds or at sea), if continued for decades, presents the gravest of problems.

– *from pages 9, 64, 67*

Appendix E

James Fiore, DOE,

Letter to David Wagoner, EPA-RVII,

May 12, 1992

Department of Energy
Washington, DC 20585

MAY 12 1992

Mr. David A. Wagoner
Director, Waste Management Division
United Environmental Protection
Agency, Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

Dear Mr. Wagoner:

This letter is in followup to the telephone conversations between personnel of the U. S. Department of Energy (DOE) and the U. S. Environmental Protection Agency (EPA) concerning the West Lake Landfill site in Missouri. Based on a review of DOE and U. S. Nuclear Regulatory Commission (NRC) records, DOE does not have any liability or responsibility for the site under the Comprehensive Environmental Response, Liability, and Compensation Act (CERCLA).

DOE and its predecessors are not and never have been the owners or operators of the West Lake Landfill. Thus, the only possible source of DOE liability or responsibility for the site is the presence in the West Lake Landfill of certain residual radioactive materials (i.e., barium sulfate cake) once owned by DOE's statutory predecessor, the Atomic Energy Commission (AEC). DOE disclaims this apparent liability on the basis that the material was sold for its commercial value and not as a mechanism for disposal.

The barium sulfate cake was one of several residual materials from the extraction of uranium produced for the AEC. The residual materials were known to contain some uranium as well as valuable metals. Continental Mining and Milling purchased the barium sulfate cake and other residues in 1966. Continental moved the materials to its Latty Avenue property to extract the remaining uranium and the valuable metals contained in the residues. One process was specifically designed to extract uranium from the barium sulfate cake to permit the commercial sale of both the barium sulfate and uranium.

In 1967, Continental's lender took possession of the residues, which were eventually sold to Cotter Corporation. Most residues were shipped to Cotter's Canon City uranium mill, with the barium sulfate cake as an apparent remnant. Without nuclear licensing approval, the barium sulfate cake was mixed with soil and hauled to the West Lake Landfill for disposal. License documents indicate that: (1) this disposal was a license violation and (2) it would not have been authorized if licensing approval had been sought.

Cotter's ultimate disposal of the barium sulfate cake at the West Lake Landfill does not alter our determination that the material had commercial value when originally sold by the AEC. Continental Mining and Milling, the original purchaser, had designed specific processes for extraction of uranium from the barium sulfate cake, and the licensing record shows the involvement of Continental and its predecessor with this process for a period of years. In fact, the record also shows that Continental Mining and Milling intended to process the material at its Latty Avenue site and was willing to pay the

capital costs and take the business risk of establishing a new facility for that purpose.

From the time of the original AEC sale, all materials were considered to be "source material," and all owners were licensed under the Atomic Energy Act. Owners had an obligation to meet the licensing requirements and to factor the cost of those requirements into their business decisions. In 1976, the NRC Regional Director articulated the same position:

> "The Cotter Corporation, which was responsible for this burial, was an AEC licensee -- not an AEC subcontractor. Consequently, the Energy Research and Development Administration [a DOE predecessor] has no responsibility with regard to this material. As a former licensee, the NRC will look to Cotter Corporation to correct any safety or environmental related problems identified through our investigation."

In summary, there is no basis for DOE responsibility or liability under CERCLA. DOE did not arrange to dispose of the barium sulfate cake in the West Lake Landfill (or anywhere else); the barium sulfate cake now in the landfill was sold for commercial processing at an entirely different site.

Additional materials related to DOE's position are enclosed for your information. Should these materials not adequately clarify DOE's responsibility in this matter, we would appreciate the opportunity of meeting with EPA to discuss any additional questions you may have.

Sincerely,

James J. Fiore
Director
Office of Eastern Area Programs
Office of Environmental Restoration

Enclosures

cc:
M. Kay, EPA Region VII, w/o Enclosure
A. Wehmeyer, EPA Region VII, w/o Enclosure
D. Hoefer, EPA Region VII, w/o Enclosure
D. Newman, EPA Region VII, w/o Enclosure
R. Whitfield, EM-40, w/o Enclosure
J. Baublitz, EM-40, w/Enclosures

Appendix F

Jeb Bryan, Metcalf and Eddy, Inc.,

Letter to Diana Newman, EPA-RVII,

May 13, 1992

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 2

To Jalal El-Tayyouri	From Diana Newman
Co. MDNR	Co. EPA
Dept. X8393	Phone # 551-7887
Fax # (314) 751-7869	Fax # 551-2863

May 13, 1992

Ms. Diana Newman
U.S. Environmental Protection Agency
726 Minnesota Avenue
Kansas City, Kansas 66101

RECEIVED
92 OCT 24 PM 4:30
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Re: West Lake Landfill
Bridgeton, Missouri
Work Assignment No. C07052
Value of Barium Sulfate

Ms. Newman:

Per your request, Mr. Herb Hickman of Metcalf & Eddy's Columbus, Ohio office, has reviewed the bid documents which you telecopied to me on May 11, 1992. These documents were reviewed, along with historical information to determine whether the barium sulfate cake, which was disposed in the West Lake Landfill, had any commercial value in 1964. Herd discussed the question with Mr. Alex Lemmon, a senior chemical engineer with experience in related issues, and Mr. John Hallowell, a metallurgist with extractive metallurgy experience. Both of these persons are on M&E's staff and have experience which encompassed the time period in question. Their judgment on the issue is summarized as follows:

A determination on whether a constituent (e.g., the uranium in the barium sulfate cake) can be removed economically and effectively depends on several factors in addition to the amount of the material present. The effectiveness of a chemical process to remove the uranium from the leached or unleached barium sulfate cake in question must be determined experimentally. In addition, the economic factors are also greatly affected by conditions other than just the market at the time. Once it was determined that a candidate chemical process would actually wok, questions such as what similar chemical process capabilities were in place in a suitable location and what their availability might have been, would make a great deal of difference in determining whether to attempt the task of separation.

Accordingly, there would be little to gain by attempting to determine the market price of barium sulfate at the time or the cleanup level that would be required to make a usable product of the contaminated barium sulfate cake from Mallinckrodt. It is known that barium sulfate would never have been a high-value product. The fact that bidders for the material were advised that the Atomic Energy Commission (AEC) would not purchase the uranium recovered implies that the market demand for natural uranium was not high in 1964. The most persuasive argument is that the Commercial Discount Corporation did not identify a way of gaining any value from the material.

Commercial Discount Corporation made efforts to find whether the barium sulfate could be cleansed of the uranium contamination, and described the results as "not at all encouraging" (Letter- J.R. McKinley, Assistant Manager, Chemical Division, to Richard Champlin, Assistant Vice President, Commercial Discount Corporation. Mr. McKinley's company's name was not legible on our copy of the letter.).

EPA 0167

Barium sulfate occurs naturally as barite, and is cheap enough for such uses as weighting mud in oil-drilling, and a filler for rubber and plastics. Hence, recovery of a salable product would not justify an expensive extraction procedure and Commercial Discount Corporation would not likely have been justified in pursuing the matter further.

AEC made three offerings for the same SLAPS residues over a period from March 1962, to November 1964. The results of the first two offerings are not known to us, except that the residues were not sold under those offerings. The November 1964 offering can be assumed to address the important issues that had arisen with the earlier offers. The following points from the November 1964 offering appear to imply that the barium sulfate cake was not regarded as a valuable product.

The INSTRUCTIONS AND INFORMATION TO BIDDERS (item 4) pointed to the value inherent in the pitchblende raffinate, but did not represent the barium sulfate cake to have value itself.

The INSTRUCTIONS AND INFORMATION TO BIDDERS (item 6) advised that the AEC would not purchase any uranium from processing of the residues; presumably, this reflected the market conditions for the uranium at the time and can be taken to indicate that the uranium content of 0.1% would not be economically recoverable. (African and Canadian ores of the day were 30% to more than 60 % uranium.)

The INSTRUCTIONS AND INFORMATION TO BIDDERS (item 5) required a guarantee that the bidder would remove all the residues from the site. Part of this guarantee included the furnishing of a Performance Bond in the amount of $50,000. This can be taken to imply that otherwise the bidder might leave wastes on the site. The barium sulfate cake appears to be the material with the lowest value in the package, and so was likely the material that would be discarded as the more valuable materials were taken off the site.

Uranium (natural) contamination on the order of 0.1% would be equivalent to many hundreds of pCi/g (>600pCi/g), which could preclude uses for the barium sulfate even if there were no additional radionuclides present. The identity of additional radionuclide contamination, if any, is not discussed.

In an accompanying summary, the materials produced by the Destrehan Refinery at Mallinckrodt refers to any residues and states that African Metals Corporation retained ownership of all material except the uranium content. The one exception stated is that African Metals Corporation had relinquished ownership of the barium sulfate cake. The fact that this was apparently the sole material for which African Metals relinquished ownership is evidence that it was seen as a material of no value, i.e., a waste.

If you have any questions regarding this letter, please contact me at 891-9261.

Sincerely,

Jeb Bryan
Contractor Project Manager

cc: RPMO

Appendix G

Announcement Listing Sale

of SLAPSS Waste Materials

Sale

GOVERNMENT PROPERTY

Page No. 1 of 11 Pages of
Invitation No. AT-(23-2)-46
Dated March 7, 1962

Sealed bids in triplicate subject to the terms and conditions set forth herein, for the purchase and removal of the Government-owned property listed in this Invitation, will be received until the time, date, and at the place indicated below, and then publically opened.

Time of Opening - 2:00 p.m. EST
Date of Opening - April 10, 1962
Place of Opening - Atomic Energy Commission Office
Weldon Spring, Missouri
Bid Deposit of $2,000 is required

Inspection Invited between 8:00 a.m. and 4:00 p.m.
Arrange with H. R. Osterwald or C. H. Fisher,
Telephone St. Louis WY-3-9400
Issued by St. Louis Area Office
U. S. Atomic Energy Commission
Address: Box 470, St. Charles, Missouri

Property located in open storage on a 21-acre tract at Robertson, Missouri, immediately north of St. Louis Municipal Airport and east of McDonnell Aircraft Corporation Plant on Brown Road in St. Louis County. Residues stored are shown on attached drawing subject, "Topographical Location of Plant Facilities for Mallinckrodt Chemical Works," MCW Drawing No. 6-1403-19.

INSTRUCTIONS AND INFORMATION TO BIDDERS

1. The Bidder's attention is called to the requirement in the Special Conditions that the successful bidder will be required to obtain a license prior to the removal of any residues from the site.

2. The Bidder's attention is called to the Description contained in Article I of the Special Conditions, specifically to the relatively large quantities of rare elements contained in the pitchblende raffinate which contains one of the largest known amounts of concentrated scandium and ionium.

3. Bidders should note the requirement for a performance bond which shall be written in terms which will guarantee the removal of all residues.

4. THE BIDDER IS ADVISED THAT THE ATOMIC ENERGY COMMISSION WILL NOT PURCHASE DIRECTLY URANIUM RECOVERED FROM PROCESSING OF RESIDUES TO BE PURCHASED UNDER THIS INVITATION.

5. Samples. Bidders are invited to inspect the residues at the site and to take samples for the purpose of making their own estimates and assays of the quantities and contents of the materials for sale. Bidders may select a reasonable quantity, as determined by the Government, of samples for their retention and use for testing purposes. These samples and necessary labor and containers required for selecting and preparing the samples for shipment will be furnished without charge to the Bidder.

Appendix H

Contract for Sale of SLAPSS Waste Materials

SALE OF GOVERNMENT PROPERTY

BID

Date of Bid: April 9, 1962

In compliance with Invitation No. AT-(23-2)-46 as identified on the cover page hereof and subject to the General and Special Terms and Conditions attached hereto and the instructions to bidders, all of which are incorporated as a part of this Bid, the undersigned offers and agrees, if this Bid be accepted within 60 calendar days (60 calendar days if no period be specified by the Bidder, but not less than 10 calendar days in any case) after date of Bid opening, to purchase the residues hereinafter described and to remove same within the specified number of calendar days after notice from the Government to proceed. There is attached a bid deposit in the amount of $2,000.

Item	Description	Bid Price
All residues located at the Airport Site	As described in Article I	Lump sum of $126,550.00

Bidder Represents: (Check one)

1. That he [X] is, [ ] is not, a small business concern.
2. If Bidder represents he is a small business concern, he further represents his applicable classification as:

   (Check one) [ ](a); [ ](b); [ ](c); [ ](d).

3. (a) That he [ ] has, [X] has not, employed or retained any company or person (other than a full-time bona fide employee working solely for the Bidder) to solicit or secure this contract, and (b) that he [ ] has, [X] has not, paid or agreed to pay any company or person (other than a full-time bona fide employee working solely for the Bidder) any fee, commission, percentage or brokerage fee, contingent upon or resulting from the award of this contract; and agrees to furnish information relating to (a) and (b) above as requested by the Contracting Officer. (For interpretation of the representation, including the term "bona fide employee," see Code of Federal Regulations, Title 44, Part 150.)

Name and Address of Bidder (Street, city, zone, and State. Type or print)

620 No Benton Way
Los Angeles 26
Calif.

Signature of Person Authorized to Sign Bid

[signature]

Signer's Name and Title (Type or Print)

President

CONTEMPORARY METALS CORPORATION

Appendix I

Corrected Graphic of

"The U.S. Nuclear Weapons Complex"

Showing St. Louis Uranium Processing (SLUPP) Plant

The U. S. Nuclear Weapons Complex CORRECTED

List of Acronyms

for

The History of St. Louis Uranium Processing Plant

Radioactive Waste Sites

List of Acronyms

AEC	Atomic Energy Commission
CWC	Coldwater Creek
DNT	Dinitrotoluene
DOE	Department of Energy
EPA	Environmental Protection Agency
ERDA	Energy Research and Development Administration
FUSRAP	Formerly Used Sites Remedial Action Program
MDNR	Missouri Department of Natural Resources
MED	Manhattan Engineering District
NPL	National Priority List
NRC	Nuclear Regulatory Commission
ORO	Oak Ridge Office
PRP	Potentially Responsible Party
RI/FS	Remedial Investigation/Feasibility Study
SLAPS	St. Louis Airport Site
SLAPSS	St. Louis Airport Storage Site
SLPD	St. Louis Post Dispatch
SLUPP	St. Louis Uranium Processing Plant
TNT	Trinitrotoluene
WSCP	Weldon Spring Chemical Plant
WSOW	Weldon Spring Ordnance Works

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for

The History of
St. Louis Uranium Processing Plant
Radioactive Waste Sites

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Appendix D

St. Louis Airport Site Expert Geohydrologic Panel and Addundum Report

Appendix D

Executive Order 11988

Appendix D
Executive Order 11988
Floodplain Management

Statement by the President
Accompanying Executive Order 11988
May 24, 1977

The floodplains which adjoin the Nation's inland and coastal waters have long been recognized as having special values to our citizens. They have provided us with wildlife habitat, agricultural and forest products, stable ecosystems, and park and recreation areas. However, unwise use and development of our riverine, coastal, and other floodplains not only destroy many of the special qualities of these areas but pose a severe threat to human life, health, and property.

Since the adoption of a national flood control policy in 1936, the Federal Government has invested about $10 billion in flood protection works. Despite substantial efforts by the Federal Government to reduce flood hazards and protect floodplains, annual losses from floods and adverse alteration of floodplains continues to increase.

The problem arises mainly from unwise land use practices. The Federal Government can be responsible for or can influence these practices in the construction of these projects, in the management of its own properties, in the provision of financial or technical assistance including support of financial institutions, and in the uses for which its agencies issue licenses or permits. In additional to minimizing the danger to human and nonhuman communities living in floodplains, active floodplain management represents sound business practice by reducing the risk of flood damage to properties benefiting from Federal assistance.

Because unwise floodplain development can lead to the loss of human and other natural resources, it is simply a bad Federal investment and should be avoided. In order to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative, I have issues an Executive order on floodplain management.

Executive Order 11988 -- Floodplain Management

By virtue of the authority vested in me by the Constitution of the statutes of the United States of America, and as President of the United States of America, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4221 *et seq.*), the National Flood Insurance Act of 1968, as amended (42 U.S.C. 4001 *et seq.*), and the Flood Disaster Protection Ace of 1972 (Public Law 93-234, 87 Stat. 975), in order to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternatives, it is hereby ordered as follows:

SECTION 1. Each agency shall provide leadership and shall take action to reduce the risk of flood loss to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3)

conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

SEC. 2. In carrying out the activities described in Section q of this Order, each agency has a responsibility to evaluate the potential effects of any actions it may take in a floodplain; to ensure that its planning programs and budget requests reflect consideration of floodplain management; and to prescribe procedures to implement the policies and requirements of this Order, as follows:

(a) (1) Before taking an action, each agency shall determine whether the proposed action will occur in a floodplain -- for major Federal actions significantly affecting the quality of the human environment, the evaluation required below will be included in any statement prepared under Section 102(2XC) of the National Environmental Policy Act. This determination shall be made according to a Department of Housing and Urban Development (HUD) floodplain map or a more detailed map of an area, if available. If such maps are not available, the agency shall make a determination of the location of the floodplain based on the best available information. The Water Resources Council shall issue guidance on this information not later than October 1, 1977.

(2) If an agency has determined to, or proposed to, conduct, support, or allow an action to be located in a floodplain, the agency shall consider alternatives to avoid adverse effects and incompatible development in the floodplain. If the head of the agency finds that the only practicable alternative consistent with the law and with the policy set forth in the Order requires siting in a floodplain, the agency shall, prior to taking action, (I) design or modify its action in order to minimize potential harm to or within the floodplain, consistent with regulations issued in accord with Section 2(d) of this Order, and (ii) prepare and circulate a notice containing and explanation of why the action is proposed to be located in the floodplain.

(3) For programs subject to the Office of Management and Budget and Budget Circular A-95, the agency shall send the notice, not to exceed three pages in length including a location map, to the state and areawide A-95 clearinghouses for the geographic areas affected. The notice shall include: (i) the reasons why the action is proposed to be located in a floodplain; (ii) a statement indicated whether the action conforms to applicable state of local floodplain protection standards and (iii) a list of the alternatives considered. Agencies shall endeavor to allow a brief comment period prior to taking any action.

(4) Each agency shall also provide opportunity for early public review of any plans or proposal for actions in floodplains, in accordance with Section 2(b) of Executive Order No. 11514, as amended, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require the preparation of an environmental impact statement under Section 102(2)(C) of the National Environmental Policy Action of 1969, as amended.

(b) Any requests for new authorizations or appropriations transmitted to the Office of Management and Budget shall indicate, if an action to be proposed will be located in a floodplain, whether the proposed action is in accord with this Order.

(c) Each agency shall take floodplain management into account when formulating or evaluating any water and land use plans and shall require land and water resources use appropriate to the degree of hazard involved. Agencies shall include adequate provisions for the evaluation and consideration of flood hazards in the regulations and operating procedures for the licenses, permits, loans or grants-in-aid programs that they administer. Agencies shall also encourage and provide appropriate guidance to applicants to evaluate the effects of their proposals in floodplains prior to submitting applications for Federal licenses, permits, loans or grants.

(d) As allowed by law, each agency shall issue or amend existing regulations and procedures within one year to comply with this Order. These procedures shall incorporate the Unified National Program for Floodplain Management of the Water Resources Council, and shall explain the means that the agency will employ to pursue the nonhazardous use of riverine, coastal and other floodplains in connection with the activities under its authority. To the extent possible, existing processes, such as those of the Council on Environmental Quality and the Water Resources Council, shall be utilized to fulfill the requirements of this Order. Agencies shall prepare their procedures in consultation with the Water Resources Council, the Federal Insurance Administration, and the Council on Environmental Quality and shall update such procedures as necessary.

SEC. 3. In addition to the requirements of Section 2, agencies with responsibilities for Federal real property and facilities shall take the following measures:

(a) The regulations and procedures established under Section 2(d) of this Order shall, at a minimum, require the construction of Federal structures and facilities to be in accordance with the standards and criteria and to be consistent with the intent of those promulgated under the National Flood Insurance Program. They shall deviate only to the extent that the standards of the Flood Insurance Program are demonstrably inappropriate for a given type of structure or facility.

(b) If, after compliance with the requirements of this Order, new construction of structures or facilities are to be located in a floodplain, accepted floodproofing and other flood protection measures shall be applied to new construction or rehabilitation. To achieve flood protection, agencies shall, wherever practicable, elevate structures above the base flood level rather than filling in land.

(c) If property used by the general public has suffered flood damage or is located in an identified flood hazards area, the responsible agency shall provide on structures, and other places where appropriate, conspicuous delineation of past and probable flood height in order to enhance public awareness of and knowledge about flood hazards.

(d) When property in floodplains is proposed for lease, easement, right-of-way, or disposal to non-Federal public or private parties, the Federal agency shall (1) reference in the conveyance those uses that are restricted under identified Federal, State, or local floodplain regulations; and (2) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successors, except where prohibited by law; or (3) withhold such properties from conveyance.

SEC. 4. In addition to any responsibilities under this Order and Sections 2020 and 205 of the Flood Disaster Protection Act of 1973, as amended (42 U.S.C. 4106 and 4128), agencies which guarantee, approve, regulate, or insure any financial transaction which is related to an area located in a floodplain shall, prior to completing action on such transaction, inform any private parties participating in the transaction of the hazards of locating structures in the floodplain.

SEC. 5. The head of each agency shall submit a report to the Council on Environmental Quality and to the Water Resources Council on June 30, 1978, regarding the status of their procedures and the impact of this Order on the agency's operations. Thereafter the Water Resources Council shall periodically evaluate agency procedures and their effectiveness.

SEC. 6. As used in this Order:

(a) The term "agency" shall have the same meaning as the term "Executive agency" in Section 105 of Title 5 of the United States Code and shall include the military departments; the directives contained in this Order, however, are meant to apply only to those agencies which perform the activities described in Section 1 which are located in or affecting floodplains.

(b) The term "base flood" shall mean that flood which has a one percent or greater chance of occurrence in any given year.

(c) The term "floodplain" shall mean the lowland and relatively flat areas adjoining inland and coastal waters including floodprone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

SEC. 7. Executive Order No. 11295 of August 10, 1966, if hereby revoked. All actions, procedures, and issuances taken under that Order and still in effect shall remain in effect until modified by appropriate authority under the terms of this Order.

SEC. 8. Nothing in this Order shall apply to assistance provided for emergency work essential to save lives and protect property and public health and safety, performed pursuant to Sections 305 and 306 of the Disaster Relief Act of 1974 (88 Stat. 148, 42 U.S.C. 5145 and 5146).

SEC. 9. To the extent the provisions of Section 2(a) of this Order are applicable to projects covered by Section 104(h) of the Housing and Community Development Act of 1974, as amended (88 Stat. 640, 42 U.S.C. 5304(h)), the responsibilities under those provisions may be assumed by the appropriate applicant, if the applicant has also assumed, with respect to such projects, all of the responsibilities for environmental review, decisionmaking, and action pursuant to the National Environmental Policy Act of 1969, as amended.

JIMMY CARTER.
The White House
May 24, 1977.

(Federal Register, Vol. 43, No. 29 -- Friday, February 10, 1978)

Appendix E

Post Maquoketa Aquifer Well Records

Appendix E
Post Maquoketa Aquifer Well Records

WELLS ACCESSING POTABLE WATER IN THE POST MAQUOKETA AQUIFER

From the Files of the Missouri State Geologist

Log Number	Township	Range	Section	Total Depth
017062	47N	06E	02	400
025112	47N	06E	04	370
008562	47N	06E	09	110
017063	47N	06E	11	375
014836	47N	06E	12	207
017058	47N	06E	12	355
006601	47N	06E	12	365
003747	47N	06E	35	406
025167	47N	07E	01	365
025166	47N	07E	01	400
025473	47N	07E	03	65
024991	47N	07E	03	440
025552	47N	07E	04	483
005650	47N	07E	05	283
017205	47N	07E	05	315
016003	47N	07E	05	345
012971	47N	07E	05	375
006073	47N	07E	05	385
006119	47N	07E	05	405
004981	47N	07E	05	446
025105	47N	07E	05	457
017060	47N	07E	05	460
017061	47N	07E	05	480
003179	47N	07E	06	250
011788	47N	07E	06	255
010844	47N	07E	06	300
007473	47N	07E	06	360
003744	47N	07E	06	365
012516	47N	07E	06	385
007414	47N	07E	06	391
004808	47N	07E	06	465

WELLS ACCESSING POTABLE WATER IN THE POST MAQUOKETA AQUIFER

From the Files of the Missouri State Geologist

Log Number	Township	Range	Section	Total Depth
025475	47N	07E	08	230
011342	47N	07E	08	248
021187	47N	07E	08	350
010602	47N	07E	08	365
025175	47N	07E	08	441
025629	47N	07E	08	475
023767	47N	07E	09	150
025550	47N	07E	09	310
025548	47N	07E	10	225
025018	47N	07E	10	408
025084	47N	07E	10	446
025063	47N	07E	11	433
017231	47N	07E	12	400
025495	47N	07E	12	460
025621	47N	07E	13	442
024930	47N	07E	14	105
025186	47N	07E	14	130
024262	47N	07E	14	145
003500	47N	07E	14	165
024951	47N	07E	14	205
003515	47N	O7E	14	268
005848	47N	07E	14	280
017955	47N	07E	14	395
025551	47N	07E	14	433
025712	47N	07E	14	465
013513	47N	07E	14	475
005351	47N	07E	21	445
009719	47N	07E	21	485
025704	47N	07E	22	495
002579	47N	07E	23	200

WELLS ACCESSING POTABLE WATER IN THE POST MAQUOKETA AQUIFER

From the Files of the Missouri State Geologist

Log Number	Township	Range	Section	Total Depth
003091	47N	07E	23	267
025716	47N	07E	23	480
026688	47N	07E	24	305
007291	47N	07E	25	100
024260	47N	07E	25	230
009988	47N	07E	25	250
007976	47N	07E	26	201
008152	47N	07E	26	302
004643	47N	07E	28	345
019723	47N	07E	34	200
008367	47N	07E	35	215
002845	47N	07E	35	280
025431	47N	07E	36	100
012871	47N	07E	36	106
014677	47N	07E	36	300

Appendix F

Resolutions

St. Louis Site Remediation Task Force

RESOLUTION

WHEREAS radioactive wastes from the production of nuclear weapons by the federal government exist on many sites in the St. Louis area, which include, but are not limited to, the St. Louis Airport Site, Hazelwood Interim Storage Site, St. Louis Downtown Site, and many others throughout our community;

WHEREAS these wastes are not controlled and continue to impact upon public health, the environment, and the economic growth in the St. Louis area;

WHEREAS these wastes are situated on private properties not under the ownership and control of the U.S. Department of Energy;

WHEREAS the U.S. Department of Energy is the federal agency which has the primary responsibility to address the remediation of these sites;

WHEREAS the U.S. Department of Energy responsibly withdrew its proposed plan addressing these areas primarily due to the lack of consensus and support of the community;

WHEREAS the current FUSRAP budget allocation has not yet been adequate to allow for the planning and implementation and complete remediation of the wastes at major sites, such as the St. Louis Airport Site;

NOW THEREFORE BE IT RESOLVED that the U.S. Department of Energy should secure the appropriate funding to implement fully the remediation of these sites in accordance with the St. Louis Site Remediation Task Force goals; and

BE IT FURTHER RESOLVED that these funds should be made available beginning in federal fiscal year 1997 and continuing until final remediation is complete. These funds should establish a local U.S. Department of Energy field office, initiate remedial action at the St. Louis Airport Site, and continue current activities;

BE IT FURTHER RESOLVED that this resolution is being submitted in support of the U.S. Department of Energy's efforts to expedite cleanup of the DOE complex in the next 10 years, and

BE IT FURTHER RESOLVED that a copy of this resolution be sent immediately to U.S. Department of Energy Secretary Hazel R. O'Leary, U.S. Environmental Protection Agency Administrator Carol M. Browner, the Missouri Congressional delegation, Missouri Governor Mel Carnahan, Missouri Department of Natural Resources Director David Shorr, the St. Louis County Executive, and the Mayor of the City of St. Louis.

Approved June 18, 1996

9170 Latty Avenue Berkeley, Missouri 63134 314-524-4083

St. Louis Site Remediation Task Force

RESOLUTION

THE ST. LOUIS SITE REMEDIATION TASK FORCE HEREBY notifies the U.S. Department of Energy that the St. Louis Airport Site (SLAPS) ranks as our highest priority for remediation. We request that the DOE start the cleanup of the site in Fiscal Year 1997 for its eventual release for "unrestricted us" -- that is, with excavation and removal from surface soils of thorium/radium concentrations above 5 picocuries per gram, and from below-surface soils, above 15 (Task Force Option 4).

FURTHER, the Task Force requests that remediation for "unrestricted use" continue or begin at all North County and St. Louis City vicinity properties and haul roads, including utility corridors; the Hazelwood Interim Storage Site/Futura Coatings; the ballfields on McDonnell Boulevard; and Coldwater Creek (not necessarily in that order).

FURTHER, the Task Force requests that remediation at the St. Louis Downtown Site and the City Levee continue or begin, with cleanup to "site specific" standards for industrial or recreational use, respectively.

AND FINALLY, with respect to those radioactive wastes at West Lake Landfill which were also generated at the St. Louis Downtown Site for nuclear weapons production, from 1942-1957: the Task Force requests that the DOE, in consultation with the U.S. Environmental Protection Agency (lead agency at West Lake) and the Missouri Department of Natural Resources, develop a plan for the excavation and removal of those wastes to a minimum of the Option 3 Cleanup Level.

Approved July 23, 1996

9170 Latty Avenue Berkeley, Missouri 63134 314·524·4083

St. Louis Site Remediation Task Force

RESOLUTION

AFTER reviewing the Department of Energy's database of remediation technologies, the St. Louis Site Remediation Task Force has determined that the use of ex-situ microwave vitrification coupled with gamma ray spectroscopy and laser ablation nebulization spectroscopy in a continuous field process shows promise for:

1) Achieving the cleanup standards specified by the Task Force (July 23, 1996 resolution introduced by Kay Drey);
2) Reducing volume and;
3) Stabilizing the radioactive waste.

WE REQUEST that the DOE evaluate the merits and field protocols of the aforementioned technologies in a field demonstration on the 21.7 acres at SLAPS during Fiscal Year 1997.

FURTHER, the Task Force requests that the remediation demonstration include appropriate engineering controls to prevent [any further] contamination of the water beneath SLAPS (for example, frozen soil barrier technology to stabilize the soils during excavation) and ensure that air quality is not compromised by the emission of radon gas, volatile contaminants, or particulates in the soil and that worker health and safety guidelines are strictly adhered to during the demonstration.

FINALLY, the Task Force would like the stabilized waste resulting from the demonstration shipped to a facility licensed for the disposal of radioactive waste.

Approved August 20, 1996

9170 Latty Avenue Berkeley, Missouri 63134 314·524·4083

NO. 9610

RESOLUTION

A RESOLUTION OF THE COUNCIL OF THE CITY OF HAZELWOOD, MISSOURI, ENDORSING THE RECOMMENDATIONS OF THE REMEDIATION OPTIONS WORKING GROUP OF THE ST. LOUIS SITE REMEDIATION TASK FORCE FOR FURTHER CONSIDERATION, ADOPTION AND IMPLEMENTATION BY THE TASK FORCE.

* * * * * * * * * * * * *

WHEREAS, Radioactive waste generated by agencies of the United States government in the processing of uranium and thorium for use in nuclear weapons production is currently located in densely populated areas of St. Louis and St. Louis County, including the Department of Energy Remedial Action Site, identified as Mallinckrodt, Inc., the St. Louis Airport Permanent Storage Site (SLAPSS), the Latty Avenue Hazelwood Interim Storage Site (HISS), and the West Lake Landfill; and

WHEREAS, The need to remediate the problems thrust on the citizens of this greater metropolitan area by the storage of this material in such a densely populated area is apparent to those of us who have been exposed to the radioactive waste problem and have become knowledgeable about its danger; and

WHEREAS, The St. Louis Site Remediation Task Force has been assigned the responsibility of determining how these properties can best be restored to effective and viable uses,

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF HAZELWOOD, MISSOURI, AS FOLLOWS:

SECTION 1. The Hazelwood City Council hereby endorses the recommendation of the Remediation Options Working Group to restore the following sites to Option IV, by complete remediation of the sites to greenfield standards by the removal of contaminated material for remote disposal:

SLAPSS and Ballfields
North County Haul Routes/Latty Avenue Vicinity Properties
Futura/HISS
Coldwater Creek (Upper Part)
Downtown Vicinity Properties

SECTION 2. The Hazelwood City Council further endorses the recommendation of the Remediation Options Working Group to render the following sites viable and usable for the stated uses through Option III requirements:

SLDS - Industrial Use Standards
Riverfront Trails - Recreational Use Standards
West Lake Landfill - Industrial Use Standards

SECTION 3. The Hazelwood City Council further recommends to the St. Louis Site Remediation Task Force that the Coldwater Creek (Lower Part) be restored to a higher level than recommended by the Remediation Options Working Group, which proposed an Option III cleanup for this area. The Hazelwood City Council urges the Task Force to consider amending this to an Option IV for this area, provided this more extensive cleanup can be done without destroying the trees and surrounding environment. We believe all areas proposed for flood control measures should be cleaned up to a level of Option IV.

SECTION 4. The St. Louis Site Remediation Task Force members shall be provided with a copy of this Resolution so they can consider this input with their further deliberations.

SECTION 5. This Resolution shall be in full force and effect from and after the date of its passage.

PASSED this 17TH **day of** July, **1996, by the Council of the City of Hazelwood, Missouri.**

David W. Farquharson - Mayor
City of Hazelwood, Missouri

ATTEST:

Colleen Klos - City Clerk
City of Hazelwood, Missouri

APPROVED AS TO FORM:

Kevin M. O'Keefe - City Attorney
City of Hazelwood, Missouri

RESOLUTION NUMBER 67

WHEREAS, radioactive wastes from the production of nuclear weapons by the federal government exist on many sites in the St. Louis area, which include, but are not limited to, the St. Louis Airport Site, Hazelwood Interim Storage Site, St. Louis Downtown Site, and many others throughout our community; and

WHEREAS, these wastes are not controlled and continue to impact upon public health, the environment, and the economic growth in the St. Louis area; and

WHEREAS, these wastes are situated on private properties not under the ownership and control of the U. S. Department of Energy; and

WHEREAS, the U. S. Department of Energy is the federal agency which has the primary responsibility to address the remediation of these sites; and

WHEREAS, the U. S. Department of energy withdrew its proposed plan addressing these areas primarily due to the lack of consensus and support of the community; and

WHEREAS,the overall FUSRAP budget allocations for fiscal years 1996 and 1997 were established without the benefit of community stakeholder involvement; and

WHEREAS, the current FUSRAP budget allocation prevents the planning and implementation of the exhumation of the wastes at major sites, such as St. Louis Airport Site; and

NOW THEREFORE BE IT RESOLVED by the Board of Aldermen of the City of St. Louis that the U.S. Department of Energy should secure the appropriate funding to implement fully the remediation of these sites in accordance with the St. Louis Site Remediation Task Force goals; and

BE IT FURTHER RESOLVED that these funds should be made available beginning in federal fiscal year 1997 and continuing until final remediation is complete. These funds should establish a local U. S. Department of Energy field office, initiate remedial action at the St. Louis Airport Site, and continue current activities; and

BE IT FURTHER RESOLVED that this resolution is being submitted in support of the U. S. Department of Energy's efforts to expedite cleanup of the DOE complex in the next 10 years; and

BE IT FURTHER RESOLVED that a copy of this resolution be sent immediately to U. S. Department of Energy Secretary Hazel R. O'Leary, U. S. Environmental Protection Agency Administrator Carol M. Browner, the Missouri Congressional delegation, Missouri Governor Mel Carnahan, and Missouri Department of Natural Resources Director, David Shorr.

Introduced on the 21st day of June, 1996 by:

The Honorable Mary Ross, Alderman 5th Ward
The Honorable Robert J. Ruggeri, Alderman 24th Ward

Adopted this the 21st day of June, 1996 as attested by:

Fred F. Steffen
Clerk, Board of Aldermen

Francis G. Slay
President, Board of Aldermen

R-1
3/21/96

RESOLUTION NO. 3991, 1996

Introduced by Councilmen Dooley, Odenwald, Kersting Corcoran and Brodsky

R E S O L U T I O N

WHEREAS, the St. Louis County Council has been advised of legislation pending before the United States Congress, H.R. 1020/ S.B. 1271, the Nuclear Waste Policy Act 1995, which could lead to the transport by railway and highway of shipments of high level radioactive waste from northern, eastern, and southern states through the Metropolitan St. Louis area, including St. Louis County; and

WHEREAS, one of the proposed routes for the transport of high level nuclear waste travels through the densely populated central corridor of St. Louis County is located in very close proximity to residential areas; and

WHEREAS, in March of 1987 a train transporting radioactive waste from the Three Mile Island reactor was involved in a collision with a stalled automobile at the intersection of Macklind Avenue and Manchester Road, vividly reminding us that accidents can happen at any time; and

WHEREAS, in spite of assurances by responsible federal and state officials that shipment procedures are safe, there remain questions still unanswered regarding these procedures; and

WHEREAS, the shipment of nuclear waste materials through St. Louis County with its dense population represents an undesirable risk in the event of a catastrophic and unpredictable railway or highway accident; and

WHEREAS, St. Louis County is without sufficient emergency personnel, equipment and financial resources to safeguard its residents in the event of a major nuclear transport accident; and

WHEREAS, St. Louis County cannot and will not accept liability for a risk of this magnitude for its residents or their properties;

NOW, THEREFORE,

BE IT RESOLVED BY THE COUNTY COUNCIL OF ST. LOUIS COUNTY, MISSOURI, AS FOLLOWS:

SECTION 1. On behalf of the residents of St. Louis County, the County Council formally requests that no shipment of irradiated fuel rods be routed through St. Louis County until a deep-geologic repository is available for the permanent disposal of the long lived radioactive wastes.

SECTION 2. The County Council further requests that the responsible federal agencies provide a written description with citations, of federal regulations which would authorize and justify the routing of high level radioactive waste shipments through highly populated metropolitan areas.

SECTION 3. The County Council further requests that no shipments of high level radioactive waste be permitted through St. Louis County without there first being in place established and written safeguards and procedures for the transport of such waste so as to ensure the safe passage of such waste through St. Louis County and its communities.

SECTION 4. The Administrative Director is directed to provide copies of this Resolution to the appropriate state and federal agencies and to the Missouri members of the United States Senate and House of Representatives, and to the Governor of Missouri.

ADOPTED: March 21, 1996

DEBORAH KERSTING
CHAIRMAN, COUNTY COUNCIL

ATTEST: JEANETTE O. HOOK
DEPUTY ADMINISTRATIVE DIRECTOR

OFFERED BY COUNCILWOMAN LUBIEWSKI
September 9, 1996

RESOLUTION NO. 797

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF FLORISSANT, MISSOURI, ENDORSING THE RECOMMENDATIONS OF THE ST. LOUIS SITE REMEDIATION TASK FORCE.

WHEREAS, Radioactive waste generated by agencies of the United States government in the processing of uranium and thorium for use in nuclear weapons production is currently located in densely populated areas of St. Louis and St. Louis County, including the Department of Energy Remedial Action Site, identified as, but not limited to, Mallinckrodt, Inc., the St. Louis Airport Permanent Storage Site (SLAPSS), the Latty Avenue Hazelwood Interim Storage Site (HISS), St. Louis Downtown Site, Coldwater Creek and the West Lake Landfill; and

WHEREAS, the need to remediate the problems thrust on the citizens of this greater metropolitan area by the storage of this material in such a densely populated area is apparent to those of us who have been exposed to the radioactive waste problem and have become knowledgeable about its danger; and

WHEREAS, these wastes are not controlled and continue to impact upon public health, the environment, and the economic growth in the Florissant and greater St. Louis area; and

WHEREAS, these wastes are situated on private properties not under the ownership and control of the U.S. Department of Energy; and

WHEREAS, there is existence of high concentrations of radioactive contaminants having half-lives extending millions of years into the future; and

WHEREAS, there is the potential for the contamination of the lower aquifer system beneath the SLAPS Site and for the on-going contamination of Coldwater Creek via groundwater migration and surface water run-off; and

WHEREAS, this radioactive contamination elevates the health risk to the general public in the areas of cancer, leukemia, immune disorders, reproductive disorders and genetic defects; and

WHEREAS, the U.S. Department of Energy is the federal agency which has the primary responsibility to address the remediation of these sites; and

WHEREAS, the U.S. Department of Energy withdrew its proposed plan addressing these areas primarily due to the lack of consensus and support of the community; and

WHEREAS, the overall FUSRAP (Formerly Utilized Sites Remedial Action Program) budget allocations for fiscal years 1996 and 1997 were established without the benefit of community stakeholder involvement; and

WHEREAS, the current FUSRAP budget allocation is inadequate for the full planning and implementation of the exhumation of this hazardous waste in the greater St. Louis and Florissant areas; and

WHEREAS, the St. Louis Site Remediation Task Force has been assigned the responsibility of determining how these properties can best be restored to effective and viable uses; and

WHEREAS, the St. Louis Site Remediation Task Force has issued its report dated September, 1996, wherein it presents its conclusions and recommendations.

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Florissant that the U.S. Department of Energy should secure the appropriate funding to implement fully the remediation of these sites in accordance with the St. Louis Site Remediation Task Force conclusions and recommendations; and

BE IT FURTHER RESOLVED that these funds should be made available beginning in federal fiscal year 1997 and continuing until final recommended remediation is complete. These funds should establish a local U.S. Department of Energy field office, initiate remedial action at the St. Louis Airport Site, and continue current activities; and

BE IT FURTHER RESOLVED that the upper portion of the Coldwater Creek areas, including that portion within the corporate limits of the City of Florissant, should be fully restored to the Option IV level, provided this more extensive clean up can be done without destroying the trees and surrounding environment; and

BE IT FURTHER RESOLVED that this Resolution is being submitted in support of the U.S. Department of Energy's efforts to expedite clean up of theDOE complex in the next 10 years; and

BE IT FURTHER RESOLVED that a copy of this Resolution be sent immediately to President Bill Clinton, U.S. Department of Energy Secretary Hazel R. O'Leary, U.S. Environmental Protection Agency Administrator Carol M. Browner, the Missouri

Congressional delegation, Missouri Governor Mel Carnahan, Missouri Department of Natural Resources Director, David Shorr, and the St. Louis Site Remediation Task Force.

Adopted this 23rd day of September, 1996.

Geri Debo
President of the Council
City of Florissant

ATTEST:

Carol A Anitschke
City Clerk

Appendix G

Letter of Request

ST. LOUIS BASED UTILITY FORUM

August 21, 1996

Ms. Sally Price
Chair
ST. LOUIS SITE REMEDIATION TASK FORCE
Member
EMAB FUSRAP COMMITTEE
9170 Latty Avenue
Berkeley, MO 63134

Dear Ms. Price:

About ten years ago, the St. Louis community became aware of radioactively contaminated soil distributed over wide areas of property and rights-of-way, at the St. Louis Airport Site (SLAPS), St. Louis Downtown Site (SLDS), and Vicinity Properties (VP). Since that time, the utility companies serving those areas have acknowledged the need to take precautions while working in these contaminated areas. These precautions have involved additional expense borne solely by the utilities. In addition, precautions have been ill defined and inconsistently applied by the Department of Energy (DOE).

In order to reduce these continued utility expenses in the future and assure uniform safe working conditions, St. Louis County Water Company, Laclede Gas Company, Metropolitan Sewer District, and Union Electric Company hereby request that the DOE, through its St. Louis-based representative organization, immediately provide field and technical support on an as-needed basis to all affected public utilities. This would include 24-hour on-call emergency response to utility job sites to assess the need for safety precautions. If DOE determines that specially trained workers are required to handle the soils, then DOE would be responsible for providing such workers at that time, for any excavation and backfill necessary to assure safe entry of utility workers to repair or maintain their facilities. DOE would also be responsible for disposal of any excess excavated material. This support of public utilities working at the SLAPS, SLDS, and VP facilities would need to continue until completion of all site remediation work by DOE or until such time that DOE provides the necessary easements and funds for the permanent relocation of all utilities facilities.

While we appreciate the difficulty this may cause DOE, such cooperation and support is necessary to assure the safety of our employees.

Therefore, the representative St. Louis utilities request that FUSRAP Task Force members recommend, by a vote of the membership at the next meeting, that DOE assume the above responsibilities and also appropriate the necessary funding from this and future annual budgets to accomplish the task. In the future, each respective utility company will communicate the type and degree of DOE support expected during planned and unplanned utility construction or maintenance projects.

Sincerely,

The St. Louis Based Utility Companies

Kenneth C. Mueller
Vice President, Operation Services
St. Louis County Water Company

Harry R. Haury
Assistant Vice President - Chief Engineer
Laclede Gas Company

Robert W. Marchant
Assistant Director of Maintenance
Metropolitan Sewer District

William C. Shores
Vice President
Union Electric Company

Appendix H

Governance Support

CHRISTOPHER S. BOND
MISSOURI

COMMITTEES
APPROPRIATIONS
BANKING, HOUSING AND URBAN AFFAIRS
SMALL BUSINESS
BUDGET
ENVIRONMENT AND PUBLIC WORKS

United States Senate

WASHINGTON, DC 20510-2503

June 3, 1996

The Honorable Pete Domenici
Chairman, Appropriations Subcommittee
on Energy and Water Development
131 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Pete:

It is a little known fact that St. Louis City and St. Louis County bear a substantial radioactive waste burden from Cold War uranium refining operation in the 1940's and 1950's and also from the Manhattan Project uranium operations.

St. Louis is the location of this country's first nuclear weapons site. Unfortunately, the wastes are in the midst of the St. Louis metropolitan area and are for the most part uncontrolled (lacking even minimal signage). The waste continues to be moved and spread and there are now more than 100 properties contaminated above Department of Energy's (DOE) cleanup standards.

Except at one site, the owners of these contaminated properties were not Atomic Energy Commission or DOE contractors and did not cause the contamination that exists on their properties. The owners are innocent victims of DOE negligence. For comparison purposes, you should know that in St. Louis there are more off-site contaminated properties above DOE's standards than at Rocky Flats, Idaho National Engineering Laboratory (INEL), Los Alamos, and Sandia combined.

This is all clearly DOE's responsibility. I would like to see some positive steps taken in the fiscal year 1997 Energy and Water Appropriations bill to address this problem. Specifically, I would like St. Louis removed from the FUSRAP program line item and established as its own separate line item. In doing this, St. Louis' $17 million existing currently within the FUSRAP core budget should be transferred out of FUSRAP and into the new St. Louis line item. In addition, I would like to request an increase of $24 million dedicated to the St. Louis cleanup for a total of $41 million in the St. Louis line item.

These two steps will allow the State of Missouri and the citizens of St. Louis to move forward with a cost-effective cleanup of the St. Louis metropolitan area. I know the funding constraints which you face for your Subcommittee; however, I believe it is imperative that a sufficient appropriation be made to allow an economy of scale during this cleanup period. DOE's activity to date in facing up to its St. Louis responsibility has been tardy and woefully inadequate at best.

Thank you for your consideration and assistance in this important matter. If you have any questions, please do not hesitate to contact myself or Tracy Henke of my staff at 224-5721.

Sincerely,

Christopher S. Bond

Calendar No. 496

104TH CONGRESS
2d Session

SENATE

REPORT
104–320

ENERGY AND WATER DEVELOPMENT APPROPRIATION BILL, 1997

JULY 16, 1996.—Ordered to be printed

Mr. DOMENICI, from the Committee on Appropriations, submitted the following

REPORT

[To accompany S. 1959]

The Committee on Appropriations reports the bill (S. 1959) making appropriations for energy and water development for the fiscal year ending September 30, 1997, and for other purposes, reports favorably thereon and recommends that the bill do pass.

Amount in new budget (obligational) authority, fiscal year 1997

Budget estimates considered by Senate	$20,648,952,000
Amount of bill as reported to the Senate	20,735,645,000
The bill as reported to the Senate—	
Over the budget estimate, 1997	86,693,000
Over enacted bill, 1996	799,991,000

Because of the substantial cost that may be involved, the Committee strongly recommends the Department evaluate any legal obligation the Department may maintain regarding SEFOR and identify and evaluate any obligations that may exist from similar reactors or nuclear facilities which have transferred to non-Federal ownership. The Committee directs the Department to report its findings to the Committee within 180 days of enactment of this act.

Formally utilized sites remedial action program.—The Committee realizes that St. Louis City and St. Louis County bear a substantial radioactive waste burden from cold war uranium refining operations in the 1940's and 1950's and also from the Manhattan project uranium operations. The waste continues to be moved and spread and there are more than 100 properties contaminated above DOE's cleanup standards. In St. Louis there are more offsite contaminated properties above DOE's standards than at Rocky Flats, INEL, Los Alamos, and Sandia combined. The owners of the contaminated properties were not AEC or DOE contractors and did not cause the contamination.

The Committee directs the DOE to cooperate with the citizens of St. Louis City and County in moving forward with a cost-effective cleanup of these sites. The Department is directed to report to the Committee on the proposed course of action the Department is pursuing no later than 90 days after enactment of this act.

RECOMMENDATION SUMMARY

Details of the Committee's recommendations are included in the table at the end of this title.

URANIUM SUPPLY AND ENRICHMENT ACTIVITIES

GROSS APPROPRIATION

Appropriations, 1996	$89,900,000
Budget estimate, 1997	87,266,000
Committee recommendation	59,466,000

REVENUES

Appropriations, 1996	$60,606,000
Budget estimate, 1997	59,466,000
Committee recommendation	59,466,000

The Uranium Supply and Enrichment Activities Program funds the Department's efforts in overseeing the Government's continuing interest in the operation of the gaseous diffusion plants managed by the United States Enrichment Corp. [USEC]; developing means for using or disposing of depleted uranium; monitoring Russian uranium processing facilities to ensure that low-enriched uranium being purchased by USEC is derived from Russian highly enriched uranium removed from dismantled nuclear weapons; transferring enrichment-related technologies to the private sector; and leading the Department's uranium revitalization efforts.

The budget request for fiscal year 1997 includes a gross appropriation of $87,266,000. Once reductions are taken for revenues and use of prior-year balances, the Department requested a net appropriation of $27,800,000. Due to severe budget constraints, the

OFFICE OF THE COUNTY EXECUTIVE
SAINT LOUIS COUNTY

CLAYTON,
MISSOURI 63105

OFFICE OF THE MAYOR
CITY OF SAINT LOUIS

200 CITY HALL
TUCKER & MARKET STREETS
ST. LOUIS, MISSOURI 63103

June 13, 1996

The Honorable Mel Carnahan
State Capital Building
P. O. Box 720
Jefferson City, Missouri 63102

Dear Governor Carnahan:

St. Louis has the unfortunate distinction of being home to the largest Formerly Utilized Sites Remediation Action Program (FUSRAP) site in the country. In August 1994, the U. S. Department of Energy Undersecretary Tom Grumbly, then Assistant Secretary for Environmental Management, challenged the St. Louis region to define a course of action for the clean-up of the St. Louis FUSRAP site.

Subsequently, over the past two years, the St. Louis community and Missouri's Department of Natural Resources have collaborated with the Department of Energy to pursue a viable clean-up solution. While we have been and continue to work with the Department of Energy in good faith, we are disappointed in the Department of Energy's lack of commitment to remediating the sites to greenfield standards and removing this health hazard. The Department of Energy has gone through the motions as specified by the law, but has failed to assist the community in identifying and developing an approach that meets the region's goal for a greenfield clean-up within the federal budget guidelines.

Doing nothing is totally unacceptable to Missourians. As government officials ourselves, we recognize the difficulty in balancing restoration of the environment with tightening budgets. This, however, is a health and safety issue. The risk factors associated with the radioactive material are further elevated by their presence in a highly populated metropolitan area.

Doing nothing also has long-term, negative economic consequences. If this prime real estate is not remediated to greenfield standards, opportunities to expand our industrial base and create jobs will be limited. This is of vital importance given that St. Louis is transitioning from a defense-dependent economy to a more diverse economic base.

For the Carnahan Administration, remediation of this site would serve as a lasting testament to the Administration's commitment to the environment and the St. Louis community. If we can be of assistance to you or your staff in securing federal funds to initiate the immediate clean-up of St. Louis, let us know how we can best help. Through our joint efforts, we will assure the continued growth and quality of life for all Missourians.

Sincerely,

Buzz Westfall
County Executive
St. Louis County, Missouri

Freeman R. Bosley, Jr
Mayor
City of St. Louis, Missouri

June 13, 1996

The Honorable Mel Carnahan
Governor
State of Missouri
State Capitol Building
P.O. Box 563
Jefferson City, MO 65101

Dear Mel:

St. Louis isn't just the Gateway to the West -- it's also the gateway to the largest FUSRAP site in the country. The good news to report is that four St. Louis companies (the National Center of Environmental Information and Technology (NCEIT), Clean Earth Technologies, LLC, R.M. Wester & Associates, Inc., and Sverdrup Environmental, Inc.) have designed an innovative approach for remediating this public health hazard and returning it to greenfield standards. This team is prepared to begin demonstrating the technology if we're able to secure, through the joint efforts of our elected public officials, additional funding for the clean-up of the FUSRAP site.

From an economic development perspective, this effort will have a tremendous impact on the St. Louis region. Returning dormant, contaminated properties located within a high traffic, centrally located part of the metropolitan area back to a healthy, balanced ecosystem would allow substantive re-investment to occur. Business attraction and retention, creation of new jobs, and increased revenues that can be re-invested in projects to offset the impact of continued defense downsizing and the closure of ATCOM are critical to the region's ability to further diversify its economy.

The St. Louis region is on the move -- considerable strides have been made during the 1990s to diversify our defense-dependent economy and build upon our core competencies, which include environmental science and technology. Our commitment to regionalism is exemplified by the success of the St. Louis Defense Adjustment Program, the establishment of the Greater St. Louis Economic Development Council, and the RCGA's recent success in raising $14 million locally to invest in regional economic development initiatives.

100
SOUTH
FOURTH
STREET
SUITE 900
SAINT LOUIS
MO
63102
PHONE
314.231.5555
FAX
314.444.1122

These efforts and many others are vital to the region's continued progress and economic prosperity. Integral to our success is taking action to "clean our house." Returning the FUSRAP sites to greenfield standards is a high health priority and a high economic development priority and we request that you give it the support necessary to ensure that our community's need is fully addressed. Our organizations look forward to working with you to ensure success on this matter. Thank you for your consideration.

Sincerely,

Richard C. D. Fleming
President & CEO
St. Louis Regional Commerce
& Growth Association

Dennis G. Coleman
Executive Director
St. Louis County Economic Council

STATE OF MISSOURI
WASHINGTON, D.C. OFFICE

MEL CARNAHAN
GOVERNOR

HALL OF THE STATES
400 NORTH CAPITOL ST., SUITE 376
WASHINGTON, D.C. 20001
(202) 624-7720

SUSAN HARRIS
DIRECTOR

June 24, 1996

The Honorable Hazel R. O'Leary
Secretary of Energy
Forrestal Building
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear Madam Secretary:

Last week I had the opportunity to meet with Deputy Secretary Charles Curtis regarding several environmental issues in the State of Missouri which fall under the jurisdiction of the Department of Energy (DOE). I would like to take the opportunity to reiterate to you my concern about one of the issues, cleanup of radioactive wastes from nuclear weapons production in the St. Louis area, and urge you to assist me in reaching a solution to this very serious problem.

As you may know, waste generated from production of the first atomic weapons currently contaminates over 100 properties in the St. Louis metropolitan area. No other DOE nuclear weapons site in the nation has as many contaminated properties in an urban area, and clean up of the sites remains a top priority of St. Louis City, St. Louis County and the State of Missouri.

Remediation of the waste has been placed under the auspices of DOE's Formerly Utilized Site Remediation Action Plan (FUSRAP) program. To date FUSRAP has not been adequately funded to provide for clean-up of the St. Louis sites, and the community has been left to face a hazardous situation that threatens both the health and economic viability of the entire St. Louis metropolitan region.

At DOE's request, the St. Louis Site Remediation Task Force (the "Task Force") was formed and has met regularly to get community input and recommendations on how to deal with area clean up sites. On Tuesday, the Task Force approved a resolution, a copy of which is enclosed, urging DOE to fully implement remediation of the St. Louis sites to greenfield standards in accordance with the goals of the Task Force. To help us achieve these goals, I urge you to include $40 million in Fiscal Year 1997 federal budget for St. Louis clean-up as a separate, dedicated budget line which would become part of the DOE core budget. This should provide us a solid base upon which to build a solid clean-up program.

The community upheld its commitment to helping our nation reach its military preparedness goals. Now it is time for the federal government to uphold its commitment to the community. The political climate in which to provide a solution to this problem has never been better -- the immediate clean-up of the St. Louis sites has the support of business and industry leaders, the environmental community, and local and State elected officials.

Again, remediation of the St. Louis sites remains a top priority of my administration, and I would be very grateful for any assistance you can provide to resolve this matter expeditiously to assure for residents of St. Louis and St. Louis County the safe, healthy community they deserve.

Very truly yours,

Mel Carnahan

Mel Carnahan

Enclosure

cc: The Honorable Charles B. Curtis

St. Louis Site Remediation Task Force

RESOLUTION

WHEREAS radioactive wastes from the production of nuclear weapons by the federal government exist on many sites in the St. Louis area, which include, but are not limited to, the St. Louis Airport Site, Hazelwood Interim Storage Site, St. Louis Downtown Site, and many others throughout our community;

WHEREAS these wastes are not controlled and continue to impact upon public health, the environment, and the economic growth in the St. Louis area;

WHEREAS these wastes are situated on private properties not under the ownership and control of the U.S. Department of Energy;

WHEREAS the U.S. Department of Energy is the federal agency which has the primary responsibility to address the remediation of these sites;

WHEREAS the U.S. Department of Energy responsibly withdrew its proposed plan addressing these areas primarily due to the lack of consensus and support of the community;

WHEREAS the current FUSRAP budget allocation has not yet been adequate to allow for the planning and implementation and complete remediation of the wastes at major sites, such as the St. Louis Airport Site;

NOW THEREFORE BE IT RESOLVED that the U.S. Department of Energy should secure the appropriate funding to implement fully the remediation of these sites in accordance with the St. Louis Site Remediation Task Force goals; and

9170 Latty Avenue Berkeley, Missouri 63134 314-524-4083

BE IT FURTHER RESOLVED that these funds should be made available beginning in federal fiscal year 1997 and continuing until final remediation is complete. These funds should establish a local U.S. Department of Energy field office, initiate remedial action at the St. Louis Airport Site, and continue current activities;

BE IT FURTHER RESOLVED that this resolution is being submitted in support of the U.S. Department of Energy's efforts to expedite cleanup of the DOE complex in the next 10 years, and

BE IT FURTHER RESOLVED that a copy of this resolution be sent immediately to U.S. Department of Energy Secretary Hazel R. O'Leary, U.S. Environmental Protection Agency Administrator Carol M. Browner, the Missouri Congressional delegation, Missouri Governor Mel Carnahan, Missouri Department of Natural Resources Director David Shorr, the St. Louis County Executive, and the Mayor of the City of St. Louis.

Approved June 18, 1996

OFFICE OF THE COUNTY EXECUTIVE
SAINT LOUIS COUNTY

CLAYTON,
MISSOURI 63105

OFFICE OF THE MAYOR
CITY OF SAINT LOUIS

200 CITY HALL
TUCKER & MARKET STREETS
ST. LOUIS, MISSOURI 63103

July 19, 1996

Mr. Thomas P. Grumbly, Under Secretary
U.S. Department of Energy
Room 7A-219
1000 Independence Avenue S.W.
Washington, D.C 20585

Dear Mr. Grumbly:

We are writing to inform you of a Resolution that was passed on Tuesday, June 18, 1996, by the St. Louis Site Remediation Task Force, established by Under Secretary Thomas P. Grumbly, to define a cleanup plan for the St. Louis area. The Resolution reflects the community's sense of urgency and requests that additional funds be made available in the FY97 budget cycle to begin clean-up of the radioactive waste stored at St. Louis sites. The Resolution formalizes the concerns of the Remediation Task Force, the community, and the State of Missouri.

It is our understanding that the Department of Energy has proposed in its FY97 budget for St. Louis approximately $15-17 million. This amount will cover planning activities, Task Force emergency requirements and address smaller health and safety issues. It is estimated, however, that an overall amount of approximately $40 million would allow the real work of cleanup as planned by the Task Force to begin.

We are asking your help to carry out this Resolution by including additional funds in this appropriation cycle, or instructing the Department of Energy to provide additional funds from the FUSRAP budget. With increased funding, remedial clean-up at the St. Louis Airport Site can be initiated and vital activities at other St. Louis sites can continue.

The issue of cleanup for St. Louis is a health and safety issue for this community. For every day that this problem is not addressed the risk factors associated with the radioactive material increase. Risk is further elevated by the presence of these contaminants in a highly populated metropolitan area. It is sad, indeed, that St. Louis is the only area where waste has been deposited in a densely-populated area, and so little funding has been allocated to remediate it.

If this property is not restored to greenfield standards, economic growth opportunities become limited in an area of St. Louis that is ripe for redevelopment. Returning dormant and contaminated properties, located within a high traffic, centrally located part of the metropolitan area, to a healthy and balanced ecosystem would allow substantial re-investment to occur. This becomes even more important in light of the fact that St. Louis is transitioning from a defense-dependent economy.

Because of the serious health and safety implications, and the crippling effects on this region's ability to develop these sites, we request that you join in our efforts to take an aggressive stand and support the St. Louis Site Remediation Task Force in its Resolution. With your legislative assistance we can return the sites to greenfield standards and assure the continued growth and quality of life for all Missourians.

Very truly yours,

Buzz Westfall
St. Louis County Executive

Very truly yours,

Freeman Bosley, Jr.
Mayor, City of St. Louis

JAMES M. TALENT
2D DISTRICT, MISSOURI

1022 LONGWORTH HOUSE OFFICE BUILDING
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SUITE 206
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(314) 949-6826

INTERNET ADDRESS:
TALENTMO@HR.HOUSE.GOV

Congress of the United States
House of Representatives
Washington, DC 20515-2502

COMMITTEES:
NATIONAL SECURITY

SUBCOMMITTEES:
MILITARY PROCUREMENT
MILITARY READINESS

SMALL BUSINESS

SUBCOMMITTEE:
REGULATION AND PAPERWORK, CHAIRMAN

ECONOMIC AND EDUCATIONAL OPPORTUNITIES

SUBCOMMITTEE:
EMPLOYER-EMPLOYEE RELATIONS

CLASS WHIP
ASSISTANT MAJORITY WHIP
THE SPEAKER'S WELFARE ADVISORY GROUP

August 13, 1996

Mr. Thomas P. Grumbly
Under Secretary
U.S. Department of Energy
Room 7A-219
1000 Independence Ave. S.W.
Washington, DC, 20585

Dear Mr. Grumbly:

I am writing to inform you that a Resolution was passed on June 18,1996 by the St. Louis Site Remediation task force, which was set up by yourself in August of 1994, to define a cleanup plan for the St. Louis FUSRAP Sites. The Resolution indicates the community's consensus and sense of urgency on this issue. Furthermore, this resolution requests that additional funds be made available in the FY97 Budget cycle to begin clean-up of the radioactive waste stored at the St. Louis Sites.

Although the deadline to get additional funding for the FY97 budget cycle has passed, I strongly urge the DOE to make the additional funding available under the FUSRAP Program for cleanup of these sites. It is my understanding that the Department of Energy has proposed in its FY97 budget for St. Louis approximately $15-17 million. This amount will cover planning activities, task force emergency requirements and address smaller health and safety issues. It is estimated, however, that an overall amount of approximately $40 Million would allow for the real work of cleanup to begin as recommended by the task force.

The task force members are united on which remedial option that they want to see implemented at the St. Louis Sites. They want the sites to be fully cleaned up and restored to greenfield standards. These members believe that DOE should make the St. Louis Sites the number one priority for cleanup under FUSRAP due to the fact that there is a large amount of waste in a highly populated area. The issue of cleanup for them is a health and safety issue for their communities. I agree fully with their conclusions.

The task force's view is also supported by St. Louis Mayor, Freeman Bosley Jr., and St. Louis County Executive, George "Buzz" Westfall. According to them, if this property is not restored to greenfield standards, economic growth opportunities become limited in an area of St. Louis that is ripe for redevelopment. Returning dormant and contaminated properties, located within a high traffic, centrally located part of the metropolitan area, to a healthy and balanced ecosystem would allow substantial reinvestment to occur. This becomes

even more important in light of the fact that St. Louis is transitioning from a defense-dependent economy.

In closing, I would like to request that DOE make available the necessary funds(circa $40 Million) under the FY97 FUSRAP budget so that full cleanup of the St Louis Sites can begin as recommended by the St. Louis Site Remediation Task Force.

Thank you for your cooperation on this matter, and I look forward to hearing from you soon

Sincerely,

Jim Talent
Member of Congress

JMT:th
cc: Mr. Clyde W. Frank
Mr. Alvin Alm

WILLIAM L. CLAY
1ST DISTRICT, MISSOURI

COMMITTEE ON
ECONOMIC AND EDUCATIONAL
OPPORTUNITIES

RANKING DEMOCRATIC MEMBER

MAILING ADDRESS:
2306 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-2501
TELEPHONE: (202) 225-2406

HARRIET PRITCHETT GRIGSBY
ADMINISTRATIVE ASSISTANT

DISTRICT OFFICES

5261 DELMAR BOULEVARD
SUITE B
ST. LOUIS, MO 63108
TELEPHONE (314) 367-1970

12755 NEW HALLS FERRY
NEW HALLS FERRY PLAZA
FLORISSANT, MO 63033
TELEPHONE (314) 839-9148

PEARLIE I. EVANS
DISTRICT ASSISTANT

VIRGINIA M. COOK
DISTRICT COORDINATOR

Congress of the United States

House of Representatives

Washington, DC 20515-2501

August 29, 1996

Mr. Thomas P. Grumbly
Under Secretary
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Mr. Grumbly:

Two years ago, under your leadership and guidance, the St. Louis Site Remediation Task Force was created to identify and evaluate feasible remedial action alternatives for the cleanup of radioactively contaminated sites in the St. Louis area.

The establishment of the Task Force marked a critical turning point in the Department of Energy's efforts to remediate the radioactive waste sites in the St. Louis community. Previously, the Department of Energy was often perceived as an impervious institution that was unwilling or incapable of addressing the concerns of the citizens of our community. This change is an excellent example of Secretary O'Leary's "Openness Initiative," a new policy that promises real results and savings for the taxpayers.

The St. Louis Site Remediation Task Force is expected to issue its recommendations to the Department of Energy this Fall. However, we believe the Task Force has already achieved a remarkable level of success. Through this body the various and often competing local interests - governments, civic groups and private concerns - have found common ground and made substantial progress toward a workable agreement on a plan of action for the cleanup and restoration St. Louis' radioactive waste sites.

We are very pleased with this progress. We are hopeful that the long history of policy making connected with the St. Louis radioactive waste sites, which had been characterized by discord, divisiveness and distrust, may be finally supplanted by the unity of purpose, spirit of compromise and commitment to accomplishment that is evidenced in the work of the citizens Task Force.

In recent weeks we have heard from members of the Task Force who have expressed concern that Department of Energy officials may not be prepared to give a full and unbiased hearing to the final recommendations of the Task Force. We hope this will not be the case. We believe it is of the highest importance that you give

full consideration to all recommendations of the St. Louis Site Remediation Task Force. To do anything less would jeopardize the unity of purpose that the Task Force has achieved in the St. Louis community and may once again set back all efforts to facilitate an acceptable cleanup of the St. Louis radioactive waste sites.

Also, we believe it would be of significant benefit if you were to meet with the Task Force to accept its final report. Such a meeting could greatly enhance DOE's future relations with the St. Louis community and vastly improve prospects for implementing a successful remediation program.

In addition, implementing swift cleanup action in response to the Task Force's specific recommendations will be a vital demonstration of the Department's good faith. We recommend that the DOE streamline its cleanup operations in the St. Louis area by establishing a dedicated local management office, such as was established at the Weldon Spring site. Not only will this help facilitate productive interactions with the community but it will help direct more resources into the physical cleanup of the sites and reduce the level of resources currently expended for paperwork - studies, reports and overhead costs of prime contractors.

In closing, we want you to know that we are most appreciative of the commitment the Department of Energy has demonstrated toward the St. Louis radioactive waste problems during your tenure. Your contributions have been especially helpful. We encourage you to continue to use the power of your office to maintain positive progress on the St. Louis radioactive waste cleanup program.

Sincerely,

William L. Clay
William L. Clay
Member of Congress

Richard A. Gephardt
Richard A. Gephardt
Member of Congress

WLC/mlb

RECORD OF PUBLIC COMMENT

The St. Louis Site Remediation Task Force recognized from the beginning that no single group could represent every viewpoint of the public interested in cleanup of the St. Louis Site. Moreover, in order for the Task Force to develop effective recommendations, broader input from the public was required. Even though the U.S. Department of Energy has an active community relations program, the Task Force decided to conduct its own public involvement efforts to seek broader public comment on the specific issues under consideration. Additionally, the Task Force wanted to clearly delineate its public involvement efforts from those of the DOE. Therefore, a number of activities were undertaken to ensure that broader public input was solicited. Specific activities included:

- open meetings with time reserved for public comment
- meeting notices (consisting of an agenda and summary highlights of the preceding meeting) mailed to all interested parties
- fact sheets and other written materials prepared for distribution to the public
- face-to-face meetings between Task Force members and their constituencies, including other stakeholder groups
- a Task Force mailing address and message line for public comment
- news releases for every Task Force meeting
- inclusion of Task Force updates in DOE publications
- a public meeting, held September 18, 1996, to discuss the draft final Task Force report
- postcards mailed to more than 1,000 interested parties announcing the September 1996 public meeting

A summary of public comments received by the Task Force follows.

COMMENTS RECEIVED AT TASK FORCE MEETINGS

October 11, 1994

Resident Ed Mahr Jr. discussed the history of the current sites and reminded everyone they were good location choices at the time, but population growth and business expansion engulfed those sites. He mentioned McDonnell Douglas employees, air passengers, etc., who have been in close proximity to these sites for many years. Mr. Mahr stated there used to be a "blue book" which gave radiation lines for various types of radiation in the area, but he has not seen anything like that for a very long time. He pointed out the importance of the continued work of McDonnell Douglas and other defense manufacturing companies. Continued development and expansion of defense technology is vital to U.S. strategic defense and global standing. Mr. Mahr recommended making the highest and best use of the land, such as turning this type of property over to an entity, such as McDonnell Douglas, after cleanup to use in furtherance of their business. The property could be used for expansion of businesses in each area which would promote growth and profitability into the 21st Century.

Martin Pion commented also about the sites and evaluating the real risk involved. The response he has seen thus far has been too emotional, too hyped by the media and politicians. He has a scientific background and prefers to deal just with the facts. He expressed his hope that this task force would also adhere to the facts and not let emotion run the program.

November 1, 1994

Steve Ackerman spoke during the public comment session concerning the effects the current status of the clean-up efforts would have on someone starting a business in the area, and how the clean-up work would affect existing businesses in the area, i.e. creating forced shut-downs, greater risk of exposure due to a higher concentration of airborne contaminants caused by the cleanup, etc. He noted the contamination in the HISS area goes down 14 feet. Mr. Ackerman asked if any protection was being offered by federal agencies against liability from the cleanup. He feels there should be some sort of indemnity for businesses to protect them from potential law-suits by employees or others who could claim health risks from exposure, and there should be some protection from possible shut-down of business during the cleanup. Mr. Ackerman, at the chair's request, agreed to submit a written summary of his comments to the Task Force.

December 6, 1994

Ed Mahr, Jr. spoke about several concerns. First, he said he is concerned about a study being done at the airport about potential earthquake hazards and his other concern was stormwater runoff and a rumor about construction of a reservoir. David Adler, DOE site manager, indicated he had no information concerning a reservoir, but would see what he could discover. Mr. Mahr explained his concern about liquefaction at the airport during any major earthquake, and the effect that could have on the airport. Col. Leonard Griggs said they are aware of the old lake bed, and the study is being conducted to determine what damage, including possible liquefaction, will occur at the airport during an earthquake.

Martin Pion spoke as a member of Group Against Smoke Pollution (GASP). His concern was with low-level radiation present in tobacco smoke, and a lack of concern for internal air pollution, and especially at the Airport. GASP has made a formal complaint, but would prefer to handle things in a more direct manner and asked Col. Griggs if a meeting could be arranged. Mr. Pion also asked Mayor Farquharson and the City of Berkeley representatives to look at their regulations and make changes.

January 10, 1995

Bob Shelton of the City of Berkeley asked the Task Force to give special consideration to the economic impact on any community they review as possible alternate disposal sites. He outlined problems Berkeley has faced with the loss of growth potential and jobs, due to the uncertain future of the hazard they share, and the impact on land that was formerly recreational space.

February 14, 1995

Tom Manning asked if the reduction in the number of clean-up sites under Superfund will have any effect on what we are doing or on funding for our program. David Adler said while DOE's

funding will be affected, clean-up funds for this project look fairly stable for the next couple of years. There may be a slight increase in 1996.

March 14, 1995
There were no public comments.

April 18, 1995
There were no public comments.

May 9, 1995
There were no public comments.

June 13, 1995
There were no public comments.

July 11, 1995
Tom Manning, City of Hazelwood, said city officials are discussing with the U.S. Army Corps of Engineers stabilizing the banks of Coldwater Creek pursuant to a plan developed approximately 10 years ago and put "on hold" pending resolution of radioactive waste disposal issues. He explained that recent flooding has caused a serious problem and that city officials are concerned about spreading contamination as a result. Dave Adler, U.S. Department of Energy (DOE-FUSRAP) said DOE has done a lot of characterization along the creek and that the agency has a good idea where the contamination is located.

August 8, 1995
No meeting was held.

September 12, 1995
There were no public comments.

October 10, 1995
Ted Trimpa, representing Dawn Mining Co., gave Task Force members an update about the facility. He said the facility, which is located near Ford, Washington (approximately two hours from Hanford), is licensed to accept 11(e)2 materials (basically thorium- and uranium-contaminated soil). Pricing still is being developed and work is underway to dewater the tailings pond at the site.

November 14, 1995
Randy Humbert, vice chair of the Local Citizens Monitoring Committee (LCMC) in Ford, Washington, (the Dawn Mining site), expressed his appreciation for the tour of the St. Louis Site

and for the time St. Louis Site Task Force representatives and staff took to meet with members of his committee the preceding week. He said that in the event that the Task Force decides that off site disposal is a preferred option for any of the St. Louis 11(e)2 material, the LCMC hopes the Task Force will consider the Dawn Mining facility as a disposal option. He expressed confidence that such an arrangement would prove to be both economically and environmentally sound. Mr. Humbert also explained the relationship between the LCMC and Dawn Mining Co. He said the LCMC is not beholden to the company; it has veto power regarding any material that is proposed for disposal at the Dawn site. He said the LCMC has been working to get the Dawn mine closed, and that its efforts have resulted in what residents believe is a good agreement to close the facility and remediate the site. Essentially, the plan calls for filling in open mining pits with 11(e)2 material of the sort found in St. Louis.

Bob Nelson, vice president and general manager of Dawn Mining Co., also addressed the Task Force. He said his company believes it can offer a very technically sound and cost-competitive solution for disposal of St. Louis material, and he asked for an opportunity to brief the Task Force on Dawn Mining's closure plan.

December 12, 1995
There were no public comments.

January 16, 1996
Christian Willauer, who is managing a public participation research project being conducted by MIT, introduced herself. She said she would be talking with several Task Force participants over the next few weeks in order to learn how the local community has been involved in the Task Force process.

February 20, 1996
Arlene Sandler said her remarks would address the draft final report of the Coldwater Creek Panel. She said one concern she has is that the report recommends additional monitoring data and suggests the desired information could be gathered by installing a new deep monitoring well. Ms. Sandler noted that a deep monitoring well would provide another pathway for contamination to migrate from the upper groundwater to the deep aquifer and that she opposes such action. Ms. Sandler also cited the panel's finding that the airport site is not appropriate for disposal of radioactive waste because of unsuitable site conditions. She proposed that the Task Force consider recommending removal of all the waste at the airport site and disposing of it elsewhere, as was done for a radioactive waste site in Salt Lake City.

Margaret Hermes then addressed the Task Force. She said her comments also concerned the Coldwater Creek Panel report and were very similar to Ms. Sandler's. She noted the panel's recommendation that contaminated soil along McDonnell Boulevard and the railroad right-of-way be addressed as part of measures at the airport site. Ms. Hermes inquired where that soil would be stored. She also said she thought the 100-year timeline the panel used for evaluating the impacts of the airport site on Coldwater Creek was not realistic because of the long half-lives of radioactive material. She said the panel's draft report left many questions unanswered.

Mal Donohue, a resident of Berkeley, responding to Ms. Sandler's and Ms. Hermes's comments, said he had talked with a number of his neighbors recently about the airport site and the consensus of the group was that there is a sense of urgency about talking care of the problems at the site. He said stakeholders should concern themselves with the risks, rather than expending time and energy on discussion of "micro-details." He said the Task Force should focus on taking action at the site and developing engineering solutions. He said he and his neighbors would prefer to see something be done about the site.

Ed Mahr Jr. read a prepared statement to the Task Force in which he expressed his concerns regarding ongoing contamination of Coldwater Creek via surface water runoff and proposed several corrective measures for consideration. Mr. Mahr's principal concern is to safeguard sources of drinking water. His proposed method is to account for all water that flows off SLAPS and HISS, to capture the contaminated flow and pipe it to Weldon Spring for treatment and release.

March 19, 1996

Mark Gibson, representing Dawn Mining Co., informed the Task Force that Dawn Mining Co. had submitted an unsolicited proposal to DOE to dispose of 11(e)2 material from the New York FUSRAP sites at its facility in Ford, Washington. He distributed copies of the executive summary of the proposal to the Task Force.

April 16, 1996

Charles Judd, executive vice president of Envirocare of Utah, said he would like to address the issue of disposal cost. He said Envirocare representatives have been examining costs for several months and, based on their experience at other sites, they believe off-site disposal would be less expensive than current DOE estimates. Mr. Judd said there are a couple of reasons why actual costs may prove to be significantly lower. One is that DOE's cost estimates are based on smaller volumes, whereas with larger volumes, such as those from the St. Louis Site, economies of scale can be achieved and the unit cost decreases, he said. A second reason is that certain overhead and contingencies are calculated as a percentage of base costs. As the base cost of disposal is reduced, so are the costs related to the other categories. He said he would keep the Task Force apprised of ongoing developments concerning this issue.

May 21, 1996

There were no public comments.

June 18, 1996

Tom Shepherd, representing Dawn Mining Co., advised the Task Force that Seacrest Environmental, which has done work for the U.S. Army Corps of Engineers and EPA, has proposed a joint venture approach that includes a lower estimate for cleanup and disposal of contaminated material from the St. Louis Site. Seacrest has estimated that cleanup and remote disposal could be accomplished for $450 to $600 per cubic yard.

July 16, 1996
Larry Gooden, representing Kiesel Co., said that his company and West Central Environmental Consultants are developing a process to neutralize radioactivity in contaminated soils. The process currently is in laboratory testing, and Mr. Gooden said it is hoped that this technology will prove to be a less expensive means to neutralize radioactive contamination.

Sandy Delcoure, representing Missouri Stream Team, which is sponsored by the Missouri Department of Conservation, asked for Task Force support in developing a project for the restoration of Coldwater Creek. She explained that she lives along the creek and has been interested in its restoration for several years. Ms. Delcoure also asked DOE to test her property to determine if there are significant levels of radioactive contamination deposited from creek overflow.

July 23, 1996 (Special Meeting)
Sandy Delcoure solicited Task Force support to protect and preserve Coldwater Creek for the children and the community for the future. She said that in 1991 she approached the Rivers and Trails Conservation Assistance Program, which provides technical assistance to state and local governments and local organizations for establishing and managing river and trail corridor projects. Mrs. Delcoure said she has collected signatures from state and local officials in support of restoration of Coldwater Creek and circulated copies of those letters and signatures for Task Force participants to review.

Ed Mahr Jr. addressed the Task Force, regarding his concerns about the possibility of sinkholes developing in the Florissant area which might provide a new pathway for contamination from Coldwater Creek into the aquifer below. He also proposed that a radiation monitor be installed at the wastewater treatment facility near Old Halls Ferry Road. A complete copy of his statement is contained in the Task Force files.

James Baker, director of administration for St. Louis County, read a brief statement to the Task Force from County Executive Buzz Westfall. In his statement, Mr. Westfall said he would ask the St. Louis County Council to adopt a resolution that supports the Task Force's desire to secure appropriate funding for full remediation of all components of the St. Louis Site.

August 20, 1996
Sandy Delcoure expressed support for cleaning up the airport site. She said that Coldwater Creek, which runs behind the St. Ferdinand Shrine, floods the area after heavy rains. She said the flooding is another reason why the airport site must be cleaned up to ensure the health and safety of the residents in the vicinity of the site and Coldwater Creek.

Ed Mahr Jr. told the Task Force that there was a mistake in the materials he distributed at the July 23 Task Force meeting. He said that there are 158,000 residents in St. Charles County who get their water from the wellfield adjacent to Weldon Spring, not 2,000 as previously indicated.

Tracy Henke, an aide to U.S. Senator Christopher Bond, reported on activities the senator has undertaken in support of the Task Force. She said Sen. Bond had requested additional funding, $24 million, for the St. Louis Site as part of the energy and water appropriations bill. She said the

additional money was not approved. However, the Senate Committee on Appropriations did direct DOE to cooperate with St. Louis area citizens in moving forward with a cost-effective cleanup of the sites here. Ms. Henke said Sen. Bond is committed to supporting the Task Force's efforts and that a representative from his office would be attending all future meetings.

Tom Horgan announced that U.S. Rep. James Talent wrote DOE officials to request that the St. Louis Site be made a top priority for cleanup and that about $40 million be allocated for activities here in the next fiscal year.

September 17, 1996
There were no public comments.

COMMENTS RECEIVED ON THE DRAFT TASK FORCE REPORT

September 18, 1996 Public Meeting
Joan Kelly Horn: "Let me just thank the Task Force and also thank all of you here that have shown interest in this, this is an issue that this community has been dealing with for decades. When I was in the Congress in 1991 and '92, I cannot tell you how much time my staff and I spent with the Department of Energy, with the residents in the affected areas, with the local elected officials in the affected areas and I always, always supported full funding for the Department of Energy to clean up the sites. Without full funding for the program to clean up these sites, it is pure rhetoric to say I support cleaning up. So I think we call need to ask Mr. Talent, who has voted to eliminate the Department of Energy, to eliminate the civilian programs that the Department of Energy -- these are all separate votes and we have all this documented -- we cannot get it cleaned up if we don't have full funding. I would continue to support full funding for this cleanup. The people in this community have waited long enough. This has been, as we all know, waste from 50 years ago and who knows what kind of damage it's been doing, so I am just again sort of chagrined to see that things haven't moved forward faster than they have because it seems like not a lot has happened since five or six years ago. On the other hand, the Task Force has worked very hard and come up with a very fine report, which I have obviously have not had time to study very carefully, but hopefully now this will be the beginning of the end of the process and the first step to getting the record of decision and to moving on and getting this cleaned up and relieving this community of this burden that we've had so many years. But do keep in mind -- we don't do it if we don't have any money, if we don't have a Department of Energy."

Ken Midkiff, director of the Sierra Club in Missouri, offered the following comment: "We [the Sierra Club in Missouri] have approximately 10, 000 members with 6,000 of those members being in the St. Louis metropolitan area. We are not on the Task Force but we did sit in on and follow the procedures closely and occasionally even commented out of turn. We discovered this was a very long, laborious and occasionally contentious process; however, we do feel that the Task Force arrived at conclusions that are commendable and applaudable and that we fully support. It only makes sense to clean up to the highest standard those areas that are most likely to expose the public to health risk. The three sites that were deemed to present less risk are selected for a lesser cleanup. It would seem to be imperative that the airport site be cleaned up to the highest standards. It is in a flood plain and in an area likely to contaminate surface and groundwater. This

property was also previously owned by the Atomic Energy Commission and was deeded over in a Quitclaim to the airport. If it were still AEC property it would be absolutely necessary that the federal government clean it up. Just because it's changed hands does not make that nay less necessary. We would ask that the Department of Energy proceed in the most expeditious manner to implement the recommendations of the Task Force. Similar to what was done at Weldon Spring. Finally, I do wish to point out that there are no good solutions to dealing with radioactive waste. We as a society can only choose among a list of pretty bad alternatives and we must choose the one then that is least objectionable. We do not believe that transport of radioactive waste to Utah is a good idea but it appears to be the only alternative that meets the criteria. At least the waste will be stored in a place where it's properly supervised and where the public will not be exposed. To leave the waste in areas where the public is likely to be exposed is completely unacceptable. It is also a travesty that as a society we continue to produce radioactive waste. There are no solutions, there are only problems. We are leaving a terrible legacy for future generations. The only real solution is to stop producing the stuff and deal with what we have."

Jerry Klamon offered this statement: "I work with several environmental organizations. I have been organizing the Earth Day Festival in St. Louis for the last five or six years. I would like to congratulate the group, the St. Louis Site Remediation Task Force, on developing consensus on the report. I think that's nothing short of miraculous. And I think what's really important now is that the Department of Energy really accepts that this community wants this problem taken care of. The weapons that were created -- really the problem is a by-product of those weapons -- were done for this country as a whole. And I think it's extremely important that the government shows by example that it's very important to clean up the messes that you make. It's very difficult for us to tell industry that they shouldn't do what we call environmental borrowing by leaving pollutants around and I think this is a case where they didn't know very much when the weapons were manufactured, there were a lot of mistakes that ere made, and that the problem of cleaning it up is something that needs to be shared across the country on the tax base and should be done right. It's just critical that it be done right. And as part of that process I think it's important that the Department of Energy establish a staffed field office to expedite the St. Louis cleanup, that's the way we can really make sure that it's done properly. There are people here that can take care of it, that monitor the process and I think nothing else will really be acceptable to this community."

Laura Newman made the following statement: "I basically wanted to express my thanks to the citizens stakeholders committee and heartily request that the Department of Energy respect this well-thought out, consensus-based report. I have heartfelt respect for the integrity and intelligence of several of the people who served on this Task Force, unfortunately I don't know all of them but the ones I do know I have a lot of respect for, and I really trust that a recommendation that received their consensus approval represents the best case for remediation. I urge the Department of Energy to act on this plan absolutely as soon as possible and to consider that the densely populated area of metropolitan St. Louis deserves to have immediate cleanup."

Virginia Cook, representing U.S. Representative William Clay, offered this statement: "I just want to bring to the attention of the body here that there was a letter, and it will be in the final report, from Congressman Gephardt and Congressman Clay to the Department of Energy. This letter was dated August 29, 1996. It was directed to Mr. Grumbly, the [undersecretary] of the Department of Energy. I'll just be very brief and read part of a paragraph form the letter where the congressmen tell [Mr. Grumbly], `We believe it would be of significant benefit if you were to meet with the Task Force to accept its final report. Such a meeting could greatly enhance DOE's future

relations with the St. Louis community and vastly improve prospects for implementing a successful remediation program.'"

James Baker, representing St. Louis County Executive Buzz Westfall, read the following statement: "It is a pleasure for me to take this opportunity to address our public officials and our entire citizenry on a topic of great importance to St. Louis County and its surrounding areas. In 1990 at my inaugural address I spoke to you about the challenges and opportunities I would face as your county executive. Quoting from that address, `While environment concerns must be balanced with other factors, the bottom line is that nothing is more critical to the quality of our lives than the air we breathe, the water we drink and the ground we walk on. As county executive, I will do everything in my power to prevent the nuclear waste bunker near Lambert Field. The people of the region have spoken loud and clear on this facility. They don't want it in St. Louis County and the federal and state governments ought to listen to what the people have said. I will do my best to see that the people are heard and their wishes respected.' In November of 1990, the people made their voices clearly heard by exercising their franchise to opposed plans to build a nuclear bunker near Lambert Field. To this end I formed the St. Louis County Hazardous Waste Commission. Members of that body were then asked to participate as members of the St. Louis Site Remediation Task Force. The achievement of the Task Force has truly been a watershed event in creating what I referred in my 1992 State of the County Address as a new spirit of cooperation. The Hazardous Waste Commission members, Task Force members and citizens at large have spoken with one voice that our area should be free from environmental and health risk posed by the presence of radioactive contamination in their midst. The new spirit of cooperation has proven to be a testament to the vitality, intellectual talent and civic responsibility of a citizenry that travels the path of excellence in choosing to enter into an honest discourse with its government for the welfare of everyone concerned. I am proud to be part of an effort that has been energized by this spirit and I will work to achieve full remediation of the affected properties in our region. Because of your new spirit of cooperation, I now share with you a new sense of hope that economic development will thrive on land that was once abandoned and that children will again play on green fields and on the banks of the Coldwater Creek. I urge all citizens of this great region to share in this vision. I offer you my congratulations and my continued commitment to turn our hope into reality."

Charles Riggs of Sverdrup Environmental: "I would like to thank he Task Force for allowing me to speak to you this evening and I am here to express Sverdrup's support for the findings and recommendations that are put forth in the committee's report to the Department of Energy. We've been part of the greater St. Louis community for years and we agree that the radioactive contamination at the FUSRAP sites must be removed and the time for action is now. We have been directly involved in cleaning up such environmental legacies in many areas of the country. We, as a corporation, know how to get the job done. We have joined a team of local businesses that are also very experienced in dealing with environmental problems of this magnitude and that can implement the Task Force recommendations. In addition to Sverdrup, our team includes the National Center of Environmental Information and Technology, Clean Earth Technologies and R.M. Wester and Associates. We are all businesses with vested interest in the St. Louis community. We have made a proposal to the Department of Energy for that purpose. We have described and offered a unique combination of cost-effective proven technologies for remediating the specific hazards by the FUSRAP wastes. The application of technologies that we have offered would provided enhanced material handling and waste form preparation for the reduction of risk during transportation and for the protection of human health in the environment. We see this as

an opportunity to partner with the Department of Energy to bring about the successful remediation of St. Louis sites in accordance with recommendations of the Task Force."

David Shorr, director of the Missouri Department of Natural Resources: "As indicated, my name is David Shorr. I serve Governor Carnahan and the citizens of Missouri in the capacity as cabinet secretary for natural resources. Consistent with the Missouri constitution, my agency's responsibilities are environmental control and preservation of Missouri's natural resources in this state. These include all state responsibilities related to the Superfund cleanups in this state. Governor Carnahan and I would like to extend our personal thanks to the Task Force members for your hard work and dedication. Your report is quality and represents a unique assemblage of our citizens' point of view. We are grateful for the opportunity to assist you. The department has had a nice working relationship with the Task Force but more importantly we are grateful for your desire to improve our great urban center. Governor Carnahan is deeply concerned about the legacy of nuclear weapons waste in the St. Louis City and St. Louis County area. Nowhere else in the United States do DOE's nuclear weapons waste reside in such an uncontrolled urban setting. Nowhere else in the United States do such federal weapons waste receive so little attention from the Department of Energy. We are pleased that recently the DOE administration has taken a direct interest in our sites and has focused attention internally on our needs and our concerns. Governor Carnahan agrees with the Task Force that DOE should expeditiously address the St. Louis waste problem and bring the matter in its entirety to a conclusion in concert with the wishes of St. Louisans. We encourage DOE to review the hard work and effort of this Task Force and propose a responsive set of alternatives to meet the Task Force goals and objectives. When the citizens of St. Louis were called upon by the United States government to participate in the war effort, they responded knowing that many American youth would be sacrificed by yet another delay, they didn't wait for concerns and conclusions, they proceeded counting on their leaders to handled the consequence. Now, it is time for the United States government to mobilize to meet their task; that is, a proper cleanup in our community. Governor Carnahan has been working with DOE officials to bring about the cleanup that St. Louis deserves. He has met with key DOE officials and has been encouraged by their courage, willingness to resurrect priorities in light of the Task Force efforts and information by state, city and county officials. We are hopeful that DOE using the Task Force goals will expedite and focus their effort. As director of the Department of Natural Resources, I want to state for the record and for inclusion in the Task Force report that the aquifer that underlies the airport site and many other sites in north St. Louis County is a usable aquifer that provides potable water by Missouri definition. Importantly, it is the only bedrock aquifer in the area that yields potable water because the other aquifers are too high in dissolved solids. I will submit a listing of wells drilled into this important aquifer for the Task Force's use in inclusion in appendices of this report. It should be DOE's responsibility to protect this aquifer, not to put it at risk by inaction or short-sighted remedies. I also want to comment on EPA's involvement in this effort. I am disappointed in EPA's failure to encourage DOE as the sole [potentially responsible party] in this Superfund site to bring these cleanup efforts to closure. This Task Force report is a valuable stepping stone in the Superfund process and should be used to provide stimulus to a conclusion. Thank you for the opportunity to comment and most importantly it is all too often we do not get out citizen participation in the efforts that we work on and I truly wish to thank the Task Force for their time and effort."

Barbara Cooper, representing U.S. Representative James Talent: "Good evening. I want to thank you for this opportunity to make a few remarks for the records regarding the final report of the St. Louis Site Remediation Task Force. First of all, I want to say that I strongly support the

conclusions and recommendations of this Task Force. The Task Force has worked very hard over the past two years in coming to its conclusions on this matter. The recommendations of the Task Force report have overwhelming community support as evidenced by the report's unanimous approval at the September 17 Task Force meeting. The report will now be submitted to the Department of Energy for its consideration. I will be meeting with DOE Undersecretary Thomas Grumbly on September the 25th to personally request that the DOE adopt the Task Force's recommendations for cleanup. At this meeting, I will reaffirm the massive community support for these cleanup recommendations by the Task Force, the Task Force which Mr. Grumbly himself created in August of 1994, to recommend cleanup remedies for the St. Louis FUSRAP sites. In addition to this, I will continue to work to keep up the momentum, including providing the necessary funding for the cleanup to proceed as recommended by the Task Force. Another vital priority must be the prioritization of the site cleanup. The areas involved are highly populated and therefore we must take care how the materials are removed and how these materials will be transported. To that end, should the DOE approve the Task Force recommendation, I will fight to ensure that the waste is transported in a safe and effective manner, avoiding any highly populated areas. In conclusion, I would like to express my personal gratitude to all of the members of the Task Force for their tireless work on this project for the past two years and congratulations to each of you on a job well done."

Sandy Delcoure: "My name is Sandy Delcoure and I adopted Coldwater Creek under a program called Streams for the Future which is sponsored by the Missouri Department of Conservation and the Conservation Federation of Missouri. In 1991 I approached the Rivers and Trails Conservation Assistance Program which provides technical assistance to state and local governments and local organizations for establishing and managing river and trail corridor projects. I collected signatures from state and local officials in support of the restoration of Coldwater Creek as a greenway for the community in the future. I support the proposal to ship much of the radioactive waste at the airport and along Coldwater Creek to remote areas away from the heavily populated St. Louis community. I also encourage that the microwave vitrification process be seriously looked into and a field demonstration project be done with it and the radioactive waste sites concerned. It appears to be a logical solution and prevention of further contamination of the area through the cleanup and dust, et cetera. I would like to thank the Department of Energy, the Task Force and especially Kay Drey for all the time and work they have done on the Task Force in the last two years to come up with a solution to the problem of our radioactive wastes in the St. Louis are. A lot of time and effort went into their report and they are to be commended for the fine work they all did together."

Chuck Blumenfeld offered the following statement: "My name is Chuck Blumenfeld and I represent Dawn Mining Company. Dawn is a uranium milling company that is no longer operating in Ford, Washington, that has a lined impoundment which has been licensed to receive 11(e)2 material. And we are here tonight, not being so presumptuous as to comment on the Task Force, but just to make some comments about some of the issues that we have been involved in. First, I want to thank the Task Force for allowing us to participate in the meetings and it's been a fascinating process and I can say I don't think anybody has worked in a group that has been as diligent and hard working and thorough as this Task Force. We just wanted to emphasize that the Task Force conclusions with regard to the cost of off-site disposal are very important. The Department of Energy's report vastly overstated what the costs of off-site disposal would be in relation to on-site disposal. And the Task Force has been very diligent in looking at those costs and concluding that the costs would be about the same for on-site and off-site. One caution we

would like to impart with regard to the microwave vitrification, and I'll submit this report for the record for comment, the Department of Energy in 1995 had a peer review group looking at various ways of handling radioactive materials and the peer groups concluded that no further money should be spent by the Department of Energy on that particular technology because it did not have a lot of promise in effectively reducing large volumes of radioactive material and obviously we want off-site disposal because that meets our objectives. But I think it is important for the community to recognize that the Department of Energy, with all due respect, seems to enjoy studying things more than moving things and spending a lot of time looking at a technology if it's not going to be effective, should be looked at carefully by the Task Force. Finally, we have been involved in a couple of other locations that have material like this and I just want to impart how lucky you all are to have as effective and committed congressional delegation to look at this issue. That is the way the other sites that are being remediated by the Department of Energy were initiated. It was by getting strong support form the congressional delegation and the governor and it appears that you have that and I believe that will be very effective in pursuing your objectives."

Anna Ginsburg read a statement from Mayor Freeman Bosley, Jr. of the City of St. Louis: "I want to thank the St. Louis Site Remediation Task Force for two years of hard work culminating in the report which you are reviewing tonight. Your accomplishments are an excellent example of good things that can happen when we all work together as a region. I am especially pleased to see that you have made the protection of the public health and the environment priorities in your recommendations for remediation. In 1990 the voters of St. Louis overwhelmingly voted against the establishment of a permanent radioactive waste bunker in the area. Your report clearly reflects the community's desire to see this waste cleaned up. Over two million people live in the St. Louis area. We don't need to continue living with one of the largest volumes of nuclear weapons waste in the country. Some areas in St. Louis have been contaminated for over 50 years. Now that the Cold War is over it is time for the federal government to clean up. When Thomas Grumbly from the Department of Energy cam here two years ago he asked the community to come together and find a mutually acceptable solution to this problem. You have done your job. We now ask the federal government to do theirs. I want you to know that I fully support the recommendations in this report and intend to continue working with the citizens of the region until the cleanup is complete."

Martin Pion: "I'm here representing the Missouri GASP (Group Against Smoking Pollution) as its president as well as myself as a resident in North County. I have addressed the Task Force before and so some of you will be familiar with my remarks and my position on this. I'm not here as a politician. I don't have to be re-elected so I don't have to say the popular things. I'm really disappointed that this much effort and time has been put into pursuing this issue, which I see as a low-risk issue for most of the people in the St. Louis metropolitan area. And we're talking about a vast amount of money that ultimately we have to fork up -- it's coming out of our pocket. We should be very concerned that our money is being well spent. That's what all the Republicans are saying these days. I'm not a Republican, by the way. What I want to address as briefly as I can is the issue of risk. One of the things that we do worst, and often these things are driven by political consideration, is assessing risk. One of the things I've learned over time as an environmentalist is that environmentalists are extremely good in getting the public very alarmed about things but they're extremely bad about assessing the relative risks of these things that they're getting the public alarmed about. Because I've been an environmentalist for many years and I've been alarmed about many things in the past as a coordinator of Friends of the Earth in England. Kay Drey is a remarkable person. I have to give her credit for being an incredibly determined and very

intelligent person, but I wish she had spent her 18 years devoting it to a higher-risk project -- and I could giver he something to do if she were interested. I don't think she is. Kay Drey will agree with me when I say that if we're looking for things of concern that fall under the heading `Radioactive Risk' that one of the major risks that we're exposed to -- well, there are two that I want to mention tonight. One is radon that is naturally occurring in the ground under our homes and collects in some of our energy-efficient homes -- I don't have one -- but that affects everybody in the St. Louis metropolitan area. It's naturally occurring. Kay Drey's problem is that she focuses on the man-made radiation issues and she's absolutely totally absorbed with that and anything that's man-made must be bad and we have to get rid of it no matter what the cost. That's not rational, I'm afraid. That's her big weakness as I see it. Now, I'm just one person and Kay is one person too. Let's talk about two issues. One is close to my heart and one is less close. As president of Missouri GASP, I'm interested in getting smoking out of my life, other people's smoking. We're in a smoke-free room here but I checked with the hotel before coming out here and everywhere in this hotel, apart from this room, smoking is allowed. Tobacco smoke contains among the 43 carcinogens, known or suspected human carcinogens in tobacco smoke is one radioactive. At least one, I think there's two. Polonium-210 is a radioactive component in tobacco smoke that all of you breathe in when you're exposed to it. So if Kay Drey wants the radioactive issue to get a handle on, I recommend that she gets a handle on that. There's 53, 000 people estimated that die from environmental tobacco smoke every year. That's a much bigger problem than the low-level waste at the airport over which, apart from Kay Drey, nobody can actually say that anyone has died from that radioactive waste that we've got. I'm not saying that we shouldn't deal with it because of that, but I want to put it into perspective. I talked to a gentleman today and he said `Well, why not?' By the way, we could spend $20 million on tobacco control or anti-smoking programs, TV ads, and we'd have a much bigger impact in the St. Louis area reducing mortality. This is the sort of problem that we could solve is we started to do something about smoking among adults. Talking about non-smoking, it doesn't cost anything to put up a No Smoking sign. Let's talk about it we want to spend money. We're obviously keen on spending $600 million. I talked to some people about radon mitigation. We could spend $600 million I estimate and we could test all the properties in the St. Louis area, metro St. Louis -- this is just a rough estimate, by the way, back-of-the-hand estimate -- but for about $600 million we could test all those properties. It costs about $105 per property and we could remediate all of them as well, every single home. Let's suppose they all needed remediation for $600 million, the cost for 90 percent of those homes is less than $1,000. And for 10 percent I was told it could be as high as $1,400. We could do all that and really reduce the radiation exposure in the St. Louis area and actually that would be an accomplishment. So what I'm saying here is let's balance. Let's look at the risks, no emotionally because that's the way we do it most of the time. We don't want it in our back yard. That's what the referendum said -- Do you want a radioactive waste site in your back yard? Who's going to say yes? But give some choices and people will choose to be more rational about it. So what I'm saying is let's be rational about this. I'm not a 100 percent thrilled by this outcome. I don't want to see $600 million spent this way."

Pat Waterson: "I'm Pat Waterson from the Missouri Coalition fro the Environment. The Missouri Coalition for the Environment applauds the St. Louis Remediation Task Force on its difficult work for the past two years. Unanimous agreement of the Task Force that the waste from the St. Louis site should be cleaned up and removed from Missouri's largest population center is a precedent-setting decision and the Coalition strongly supports it. The St. Louis site is the oldest radioactive waste of the atomic age. On April 2, 1942, Mallinckrodt Chemical Works near downtown St. Louis began the experiments to purify the uranium needed by the federal government for the Manhattan

Project. They accomplished their mission in 50 days and continued to produce radioactive waste in St. Louis for the next 25 years. For the past 25 years the Coalition has been a strong voice for a cleanup of the St. Louis site. In April of 1992 we hosted a symposium entitled `A Mountain of Waste 50 Years High.' The Coalition continues to oppose the use of nuclear power and weapons. We request that the Department of Energy establish a fully-staffed field office to expedite the St. Louis site cleanup comparable to the office set up at Weldon Spring. Thank you and we appreciate the change to speak at this public meeting. And I agree with the previous speaker that smoking is a big deal and I would urge everyone to think carefully about -- this is a personal comment on my part -- about the supports we have for the tobacco industry in this country. I think that's also an important issue."

Arlene Sandler: "I'm a county resident, a Missouri River water drinker and a follower of this problem for about the last 15 years and I just wanted to take a half a minute to thank the Task Force as everyone here has for two years of very hard work and what I see as maybe the first step at last toward the possible end of this problem at least in the St. Louis area because it is a problem that really never goes away. Realistically, I thin that the cleanup will only happen when that field office is set up, just as what's happening in Weldon Spring. They have a field office there and cleanup is ongoing. Thanks again."

Rachel Loche: "Hi, my name is Rachel Loche and I'm a resident of the City of St. Louis. And I've just come to add my voice to the tens of voices here and to the thousands of those that are probably out in places beyond this building who applaud the Task Force's recommendation for the cleanup of radioactive waste in our neighborhoods. I think that the course of action that you've decided to take is not only the best thing to do but it's the right thing to do -- both for ourselves here and for our future generations. Thanks."

Mal Donohue: "Hi, my name is Mal Donohue and I'm a resident of Berkeley and I commend the commission, the Task Force, for the work they've done over the past two years. I was fortunate to be able to attend a few of their meetings. I disagree wholeheartedly with their recommendation. I believe it is fiscally irresponsible. I totally agree wit this gentleman right here, I think he's a kindred spirit. I think there are many more risks that we have to deal with every day whether it's municipal garbage being thrown in landfills which are unlined and can leak in aquifers with risks which are many, many fold of magnitude greater than what we're dealing with -- a low-level radioactive waste. I believe it's politically incorrect for people to jump on a bandwagon and make accusations, rhetorical remarks that aren't based on fact. They're simply just remarks. And marketing people who come and try and sell their goods and services to the Department of Energy. I would really like to see the money be used responsibly. I'd like to see people have a sense of urgency about the cleanup and I would like to see people take a look at the facts, like this gentleman said, and make sure that we're spending the money responsibly. Because it is our money, it's our tax money. Thanks."

Ed Mahr: "Two directions. In the future I think people are going to have questions and they have to direct them to somebody. Now, in the past when I call up Weldon Spring's trailer I didn't get an answer that I considered satisfactory because the people with the know-how were out and you got the secretary. I think that we have to set up some place other than the technical deciders of the issues where the average common person can get a question answered in a semi-technical or an extremely technical manner and I think it has to be somebody from the Task Force. And Sally Price, I don't know, she might be great, Kay might be great, but those two people are very busy

and I would like to nominate Jim Dwyer because he's been, you know, through the entire thing and he knows all the little foibles of all the little people. The second comment, this is just random thoughts. I was not a member of the Task Force, I was just there. And these are just partial sentences but actually it was about two years of comparing apples and oranges, each person looking at different parts of the elephant. No one else in the world had to come up with a satisfactory solution for the waste problem that was without faults. And some of the people knew the potential horror of the atomic legacy -- some of the speakers, not the Task Force members, of course -- but some of the others didn't know a millirem from a millennium. There were 50 years of other people's attempts to deal with and be dealt upon by the nuclear legacy of waste that were being discussed. Everyone felt under educated, hesitant to speak from ignorance, afraid to sound a fool, everyone was willing to pay to the god of science but the science god took a powder. The god ducked out and asked his subjects to write the commandments, tenets, and direction of endeavor. Then god asked the people to vote on their future and the people sat and daydreamed while the words droned on endlessly. One chairman of the total group ducked and their lesser subjects appeared infrequently -- some never. Some new people took their place and they all daydreamed. But finally the subject approached, a consensus of a common direction to proceed -- they voted their consciences and prayers and the subjects were ready to go to sleep and rest. But someone was still needed to form the wagon train and get it in shape for the upcoming journey. The same collie dog that was herding and watching the livestock was still alive, awake and working. The little dog had naps perhaps but he was still running his damn fool legs off to-and-fro. Without the collie, wagon-train master this journey would not have gotten even to this utopian consensus. When the journey starts, that is the actual cleanup, I hope the collie dog who is Mr. Jim Dwyer is still part of the wagon train. I just feel he deserves a nice warm pat on the head."

Jim Werner, representing the Department of Energy: "My job here has been to listen tonight and so that's what I have done mainly. I just wanted to add my thanks to the list of everybody else who has. And to give you a little perspective. I've worked on the Department of Energy cleanups for many years now and part of that has involved going out and working with community organizations as well as engineering contractors and everybody. And I've got to say that this is truly one of the most impressive, probably the most impressive, community Task Force I have seen of the dozens that I've seen around the country, so it's an extraordinary effort. And this is really exactly what it takes to get the work done. As somebody said earlier you've now done you're job, it's time for us to do ours. But I'm not sure whether, as somebody else said, this is the beginning of the end or the end of the beginning, but clearly what we now need to do is to take your Task Force report and honor it, respect it, to read it very carefully. I expect that we may have to come back and ask you some questions so that we understand it fully and really understand what we're getting at here. Although you're pretty clear from what I could see. This is not hard. But as we go forth and put together a remedy, a plan for it, I think that you all want us to be using good management, make sure we're getting a dollar's worth of cleanup for a dollar spent and use the money right, use good engineering, use good common sense and to use a democratic process which is what you all have done here. We do have our work cut our for us. There's been some talk about it, it's not my job to assign blame, it's our job to deal with it, but I just got the appropriations report today from Congress and it is about a $60 million cut in our account that is funding this sort of cleanup -- $59 million. So we obviously have to grapple with that for fiscal year 1997 which does not necessarily mean this site. We've got to sort that out. That's yet to be done. But this is a fact, that is a reality we now have to deal with. But I think there are a lot of options to deal with those problems. We'll look at them, that's our job. But thank you again very much for all

the extraordinary hard work. This is, I know, a volunteer work but that's what makes it tick. So you push us to do our job better. So thanks again."

A transcript of the public meeting is available.

Oral and Written Comments Received by September 23, 1996
One comment was submitted on the draft report.

Submitted by Martin Pion:

I would like to make the following observations and comments for inclusion in the public record. These comments are from the perspective of a resident in North St. Louis County since 1977, a scientist employed by McDonnell Douglas Co. for 11 years working in close proximity to the contaminated airport and Berkeley ballfields sites, and as president of Missouri GASP, which is concerned in part with the protection of nonsmokers from exposure to environmental tobacco smoke.

1. Background.

1.1 I attended the first public meeting into this issue at Berkeley High School. I no longer have a record but I believe it took place in 1990. It appeared to have been organized by then St. Louis County Councilman John Shear, since the postcard informing me of the meeting originated from this office. Despite the presence of state Department of Health and other representatives who could have provided some insight into the relative public health risks involved, the meeting was dominated by presentations and public comments designed to heighten fears about the radioactive waste. In actuality, the meeting turned out to be a sign-up meeting for CARE, Citizens Against a Radioactive Environment. I recently learned from a member of CARE that John Shear was its facilitator, and that the group was later disbanded when Mr. Shear lost interest in it.

1.2 Referenda were held later in 1990 in the City of St. Louis and St. Louis County to determine if people support the idea of a permanent storage bunker for the radioactive waste at the airport site.

The county referendum read: *Should the U.S. use what is commonly called the airport site for the construction of a permanent radioactive waste bunker?* The No vote was 85.6%.

The city referendum read: *Should a radioactive waste bunker be constructed on real property owned by the City of St. Louis commonly known as the St. Louis Airport Storage Site or on any site within the corporate limits of the City of St. Louis for the purpose of permanently storing radioactive waste generated by the production of nuclear weapons which was is currently located at SLAPS, at 9200 Latty Avenue in the City of Hazelwood, at the Mallinckrodt Chemical works facility at Second and Destrehan streets in the City of St. Louis and at related sites.* In this case the No vote was 80.7%.

1.3 At a public hearing organized by the DOE on January 28, 1992, at the same Berkeley High School, St. Louis County Councilman John Shear reportedly said: "Put all the charts and graphs aside, and get this stuff out of here." [St. Louis Post-Dispatch, Jan 29, 1992]

1.4 Councilmen and/or mayors from the cities of Hazelwood, Florissant, Berkeley and St. Louis, which either are neighboring the waste storage sites or have such sites within their boundaries, also came out against either leaving the waste in situ or consolidating it into a bunker at the airport.

1.5 Dr. Henry Royal, Professor of Radiology, Mallinckrodt Institute of Radiology, Division of Nuclear Medicine, Washington University, St. Louis, addressed the DOE public hearing in January, 1992, and raised questions about the level of health risk and the expenditures of such large sums for cleanup. He suggested that money could be better spent on health care for the poor. [St. Louis Post-Dispatch, Jan 29, 1992]

In a commentary article "Nuclear Policy Driven by Fear, Not Facts," which appeared in the St. Louis Post-Dispatch, Dr. Royal wrote: "How much is the correct amount of money to spend on St. Louis' nuclear waste problem? The answer to this question depends upon the available resources, an estimate of the risk and the likely cost and effectiveness of the proposed solution. We must distinguish the perceived risks of radiation from the true risks. We must look at the goals of proposed solutions and decide how likely it is that those goals would be achieved. Sadly, these considerations rarely play a major role in decision-making when it involves nuclear waste. Fear and politics dominate the decision-making process."

1.6 At the public hearing on September 18, called to solicit comments on the final report of the St. Louis Site Remediation Task Force, I posed the question: "Are there any reliable estimates as to the annual death rate among the local populations attributable to the low level radioactive waste if no remedial action is taken?

Responding to the question, David Miller, an employee of Science Applications International Corp., Oak Ridge, TN, stated that the risk was negligible. This was disputed by Ms. Kay Drey of the Coalition for the Environment.

Mr. Miller's statement is supported by the Baseline Risk Assessment for the St. Louis Site and the RESRAD modeling results prepared by him for the Task Force. Options varying from limited action [Option 1] to complete excavation [Option 4] were modeled with various use scenarios, such as commercial, recreational, residential, etc. The following is a selection of the results obtained [ref. "Dose Estimates for St. Louis Site Receptor (mrem/yr)"]:

Mallinckrodt downtown site:
Option 1 and commercial use: calculated exposure = 100 mrem/yr.
Option 4 and commercial use = 5.3 mrem/yr.

This is considered an intense site because of the radiation level and the fact that employees are assumed to work an average 7 hours a day indoors, 250 days a year. However, employees dress appropriately and take necessary safety precautions.

The mot high risk site is SLAPS, the airport site, although it is currently fenced and not accessible to the public.

Option 1 and commercial worker/maintenance worker = 210 mrem/yr.
Option 4, same use = 7 mrem/yr.
Option 4 and residential occupier [18 hr/day indoors, 2 hr/day outdoors, for total of 350 days of exposure, and consumes 25% of homegrown produce] = 26 mrem/yr.

The nearby ballfields, which are also currently not open to the public, present a much lower calculated risk.

Option 1 and recreational user [6 hr/week] = 4.1 mrem/yr.
Option 4, otherwise same = 1.1 mrem/yr.

For comparison, for the general population for normal exposures, I understand that the annual dose is about 360 mrem per year.

1.7 Dr. Barry Siegel is a member of the Task Force, and Professor of Radiology and Medicine and also Director of the Division of Nuclear Medicine, Mallinckrodt Institute of Radiology, Washington University, St. Louis. In a personal conversation on September 20, 1996, he said it was his belief that there is no significant public health threat from these radioactive waste sites. He also said that he did not support the Task Force's recommendations.

1.8 In April, 1993, St. Louis County Council defeated by a 4 to 3 vote a bill that would have essentially made Lambert-St. Louis totally smokefree, although it did unanimously approve another bill making all county buildings smokefree.

Councilman Shear engineered the airport bill's defeat by persuading another councilwoman, Deborah Kersting, to change her vote. Missouri GASP subsequently learned from another member of the council that, in her words, "Tobacco Institute lobbyists were camped out in Shear's office." Six months later Shear received a $1,00 campaign donation from the Tobacco Institute for his run for a state senate seat.

1.9 None of the municipalities objecting to the low level radioactive waste have sought to provide totally tobacco smoke-free air throughout their communities. This conclusion is based on copies of ordinances obtained from all the cities except Berkeley.

The North St. Louis County City of Bridgeton has enacted the most comprehensive smoking control ordinance. This prohibits smoking in all city owned buildings and vehicles near entrances, the public parts of retail stores, and other public settings, but allows smoking in restaurants and places of private employment.

The City of Hazelwood has prohibited smoking only in city-owned buildings.

The City of Florissant restricts smoking to designated smoking areas in city-owned buildings.

The same is true of the City of St. Louis.

The City of Berkeley is believed to have some smoking restrictions in city hall. The cities of Hazelwood, Florissant, St. Louis and Berkeley do not restrict smoking in places normally open to the public or the private workplace.

1.10 Lambert-St. Louis International Airport is owned by the City of St. Louis, run by a Board appointed by the city, and is located geographically in St. Louis County, which therefore also has jurisdiction over it. Airport Director Col. Leonard Griggs is on the Task Force and is believed to support its final recommendations. Meanwhile the airport permits smoking in designated smoking areas, and has refused to provide a smoke-free environment, despite efforts spanning several years by Missouri GASP.

In July 1994, Missouri GASP filed a discrimination complaint against the airport, citing the Americans with Disabilities Act [ADA]. The complaint was filed on behalf of smoke-sensitive breathing disabled individuals alleging denial of access. Col. Griggs has rebutted this complain on the grounds that smoking is not covered by the ADA. The airport is currently installing smoking rooms at a cost of over $450,000, and once complete will designate the rest of the airport as "No Smoking." However, Missouri GASP opposes these smoking rooms partly on the grounds that they are untested and likely to allow tobacco smoke to backstream into adjoining areas, and partly because they allegedly violate ADA regulations.

1.11 According to a paper published in The New England Journal of Medicine (Jan. 9, 1992, Vol. 326, No. 2 pp. 128-133) a consequence of AIDS activism has been the resulting generous funding of AIDS research at the expense of other serious causes of death. Thus, the level of federal spending per year for AIDS was $1.6 billion in 1990 after a total of 40,000 Americans died of the disease. Federal spending for cancer, which killed 500,000 in 1989, was $1.5 billion, and for heart disease, which killed 750,000, was less than $1 billion. This demonstrates clearly how funding can be inappropriately skewed by local activism of the sort directed at the low level radioactive waste sites in the St. Louis area.

1.12 Bernard L. Cohen, in a paper published in September, 1991, [Health Physics Vol. 61, No. 3, pp. 317-335] compared different risks in terms of years of loss of life expectancy [LLE]. This placed alcoholism first, followed second by poverty, and then male smoking (responsible for 6.6 years LLE) third. Involuntary spousal smoking was estimated to cause from 50 to 380 days LLE due to cancer. Indoor radon was estimated to cause nearly 18 deaths per year, corresponding to an LLE of 4 days for the 30,000 people exposed.

1.13 Dr. Bruce Ames developed the Ames Test some years ago which has become the worldwide standard for testing carcinogenicity of different substances. An article in which he was featured appeared in Hippocrates, a health and medicine magazine, in Jan.-Feb. 1988 [pp. 29-38]. The article discusses carcinogenicity in common vegetables, about which Dr. Ames has written. Under "The Risks Worth Worrying About" Dr. Ames lists causes of U.S. cancer deaths as a percentage of total cancer deaths. First is tobacco at 25%-40%, followed by diet (best estimate 35%). Radon is responsible for less than 1-2%.

In the article, Dr. Ames is quoted as saying "It is important not to divert society's attention from the few really serious hazards, such as tobacco, by the pursuit of minor of nonexistent hazards."

2. Conclusions.

2.1 The choices and information provided in the referenda were inadequate for the electorate to make a well-informed decision. No indication of actual as opposed to perceived risk was offered, despite the former apparently being considered negligible by those having no stake in removing the waste. If the only choice offered is "Do you want radioactive waste in your back yard or not?" the answer is likely to be NIMBY.

2.2 The public's perception of risk and consequent concern has prompted legislators to follow rather than lead public opinion, and in the case of at least former St. Louis Councilman John Shear, to try and capitalize on and foster this concern to promote his political career.

2.3 The attitude of local politicians towards radioactive waste remediation is hypocritical when contrasted to their general lack of concern over, for example, environmental tobacco smoke. Former County Councilman John Shear is representative of the most blatant example.
Environmental tobacco smoke (ETS) is an environmental health hazard posing a radiation risk, since among the 43 known or suspected human carcinogens in ETS is radioactive Polonium-210. This arises from phosphate fertilizers which become concentrated in the tobacco leaf. An estimated 53,000 Americans die annually due to involuntary exposure to ETS. Pro-rating from the U.S. population, taken roughly as 250 million, to the St. Louis of 2.4 million, yields an estimated 509 local nonsmoker deaths each year due to ETS exposure. This contrasts with the zero annual deaths currently attributable to the low level radioactive waste, according to several scientists.

Remediating the ETS risk requires only enactment of appropriate local ordinances and relatively modest expenditures for signage, etc. and would be expected to yield savings, e.g. cleaning, fire, health care, lost productivity.

2.4 Smoking itself can also be regarded in a similar way to ETS, except that the stakes are much higher, given that more than 400,000 Americans die each year from this cause. This prorates to 3,840 smoker deaths each year locally directly attributable to smoking. A local effort modeled after the successful anti-tobacco TV ad campaign funded by Proposition 99 in California costing, say $20 million a year, would be expected to reduce smoking rates substantially, resulting in a significant lowering of mortality and sickness due to smoking. I hasten to add that I have not researched this in terms of funding level needed or likely number of lives saved, but the basic argument is sound.

2.5 One of the options which COULD have been offered to voters in the referenda would have been to undertake a radon remediation program as opposed to a low level waste remediation program. Radon gas, after all, is a naturally occurring radiation hazard causing about 13,000 deaths per year in the U.S., according to some estimates. This prorates to 125 deaths per year for metro St. Louis.

If we assume for purposes of illustration 4 persons per residence on average, 2.4 million people equates to 600,000 homes.

The cost of an alpha track radon test in every home, at $105 ea. (1) = $63m
Assuming as many as 400,000 of those homes need remediation, with 90% remediated at a cost of $950 and 10% at $1,400, the cost of remediation = $398m

The total cost for testing and remediation = $461m, at a cost of $3.7m per life saved.

(1) Environmental Solutions [863 9801]. Alpha track 1-year radon test cost is $105 per location.
(2) Aegis Ltd. [947 0040]. Typical range for house with a basement: $650-$950. Wouldn't expect it to be more for a slab. If encounter some odd situation which involve two fans for two systems, would rise to $1300-$1400 [5%-10% of homes].

2.6 It is legitimate to take issue with some of the claims made in the final report of the Task Force. Apart from the downtown site, the affected areas are NOT highly urbanized. In fact, a more apt description for the residential areas along Latty, for example, would be suburban or semi-rural, and consequently relatively few homes are directly affected. It is highly debatable if even a sizable minority of residents in North County are affected by the contaminated waste sites, so referring to a figure of 2.4 million, which is the population of the entire metro area, is highly misleading.

Concern is expressed over the 100 year flood plain in which some of the waste is located. St. Louis experienced what was described as a 500 year flood in 1993 yet I'm not aware of any serious flooding in these areas.

The report is claimed to have a unanimous consensus. This is not true. I understand that at least some of the most respected scientists serving on the Task force did not agree with the final report, but their views were either not made known or sought for e.g. a minority report.

2.7 Dr. Henry Royal's suggestion that the money proposed for the waste cleanup would be better spent on health care for the poor appears to have merit, according to Bernard Cohen's ranking [1.12 above] but is unlikely to have popular support. Tobacco came third in that list, and is repeatedly a high priority item among the references quoted above. It should be given serious consideration as an alternative to spending money on waste cleanup.

2.8 Ms. Kay Drey, of the Coalition for the Environment, has spoken to me about the radioactive waste in the local sites, saying "We have very hot stuff here." She had also mentioned her concern about radioactive emissions from nuclear power stations. Her goal appears to be to completely remove the public's risk to radiation, but concentrating her efforts on nuclear radiation from wartime activities and nuclear energy production. As a consequence, I lack faith in her objectivity or ability to really assess the potential health risk for the public, or the number of people at significant risk, or how best to conduct remediation and/or other activities deemed appropriate. Accordingly, I would like to see

Dr. Barry Siegel, or someone of his scientific stature and qualifications, tasked to do this work on a paid basis.

2.9 I do not fell I have the expert knowledge to offer advice on remediation. However, with the qualifications mentioned above, IF remediation is undertaken, I favor the following objectives:

Purchase property from affected homeowners to compensate them for the loss in value due to perceived public health risk and take the property out of use. Compensate affected cities for any loss of real estate taxes. Alternatively, clean them up to industrial use standard.

Generous compensation for cities which have lost the use of property, e.g. the Berkeley ballfield, or clean it up sufficiently to bring it back into recreational or industrial use but not greenfield use, whichever if preferred by the affected community, and contingent on cost.

Generous compensation for private companies which have lost the use of property, or clean up to industrial use standard, whichever is preferred, and contingent on cost.

Ensure adequate containment of the contaminated soil at the airport site, including improved oversight.

Provide for a permanent presence to monitor the movement of contaminants in soil, water and air.

CALLS ON TASK FORCE TELEPHONE LINE

No significant calls, mostly requests to be added to the Task Force's mailing list.