FINAL

ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) AND RESPONSIVENESS SUMMARY FOR THE ST. LOUIS AIRPORT SITE (SLAPS) AND ACTION MEMORANDUM

ST. LOUIS, MISSOURI

MARCH 1999

U.S. Army Corps of Engineers
St. Louis District Office
Formerly Utilized Sites Remedial Action Program

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prepared by
U.S. Army Corps of Engineers, St. Louis District Office, Formerly Utilized Sites Remedial Action Program

with technical assistance from
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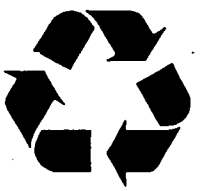

ACTION MEMORANDUM FOR THE REMOVAL OF RADIOACTIVELY CONTAMINATED MATERIAL AT THE ST. LOUIS AIRPORT SITE AND ST. LOUIS AIRPORT SITE VICINITY PROPERTIES

An Engineering Evaluation/Cost Analysis (EE/CA) was prepared to analyze alternatives for managing radioactively contaminated material at the St. Louis Airport Site (SLAPS) and St. Louis Airport Vicinity Properties Site (SLAPS VP). This document was issued for public review and comment on 5 March 1998. The public comment period extended from 6 March 1998 through 9 April 1998.

This memorandum approves interim remedial actions that will be undertaken while the process for the selection of a final remedy proceeds. The proposed action is an interim component of a comprehensive cleanup strategy for SLAPS and SLAPS VP.

This action, Alternative 2C of the EE/CA, consists of the removal of radioactively contaminated fill materials. Material will be removed in accordance with standards for radionuclide concentrations for radium and thorium in soil of 5 picoCuries per gram (pCi/g) above background in the top 15 cm of soil and 15 pCi/g above background in any subsequent 15 cm layer. A corresponding concentration for U238 will be 50 pCi/g above background for all depths of soil.

The United States Army Corps of Engineers published advertisements in local newspapers and issued a press release announcing a 30-day public comment period on the proposed action. A letter from the Program Manager, which transmitted a copy of the EE/CA and requested comments on the proposed action, was sent to individuals and members of organizations who had previously expressed interest in SLAPS and SLAPS VP.

Nine comment letters were received on the proposed action. Responses to these comments and comments received at the public meeting are summarized in a Responsiveness Summary dated June 1998. Based on the EE/CA and the Responsiveness Summary, the recommended action is considered appropriate and will be implemented in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (as amended) and the National Contingency Plan.

26 JUN 1998

Joseph W. Westphal
Assistant Secretary of the Army
(Civil Works)

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LIST OF ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Commission
ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirements
BNI	Bechtel National, Incorporated
BOM	Bureau of Mines
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeters
cy	cubic yards
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FFA	Federal Facilities Agreement
FMA	flexible membrane liner
ft	foot/feet
FUSRAP	Formerly Utilized Sites Remedial Action Program
ha	hectare(s)
HISS	Hazelwood Interim Storage Site
ICRP	International Commission on Radiological Protection
km	kilometer(s)
LLW	low-level waste
m	meter(s)
MARSSIM	Multi-Agency Radiation Site Survey Investigation Manual
MDNR	Missouri Department of Natural Resources
MED	Manhattan Engineer District
mi	mile(s)
MRA	Multiple Resource Area
mrem	millirem
MSL	mean sea level
NCP	National Contingency Plan
NCRP	National Council on Radiation Protection and Measurements
NEPA	National Environmental Policy Act
NOAA	National Oceanographic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
pCi/g	picoCuries per gram
PCOC	potential contaminants of concern

Ra	radium
RCRA	Resource Conservation and Recovery Act
RI/FS	remedial investigation/feasibility study
RME	reasonable maximum exposure
ROD	Record of Decision
ROM	rough order of magnitude
RQ	reportable quantity
RUST-CTC	RUST-Clemson Technical Center
SHPO	State Historic Preservation Officer
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SLAPS	St. Louis Airport Site
SLDS	St. Louis Downtown Site
SOR	sum of ratios
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
Th	thorium
U	uranium
UCL_{95}	upper 95% confidence level
USACE	U.S. Army Corps of Engineers
yr	year(s)

EXECUTIVE SUMMARY

The United States Army Corps of Engineers (USACE) has prepared this engineering evaluation/cost analysis (EE/CA) in support of the proposed action to remove radioactively contaminated soils from the St. Louis Airport Site (SLAPS) and the Ballfields.

From 1942 to 1957, uranium was extracted from ore at the Mallinckrodt Chemical Plant in downtown St. Louis, known as the St. Louis Downtown Site (SLDS). The Manhattan Engineer District (MED) acquired SLAPS in 1946 to store uranium-bearing residuals from SLDS from 1946 until 1966. In 1966, these residuals were purchased by Continental Mining and Milling Company of Chicago, removed from SLAPS, and placed in storage at Latty Avenue under an AEC license. After most of the residuals were removed, site structures were demolished and buried on the property along with approximately 60 truckloads of scrap metal and a vehicle that had become contaminated (EPA 1989). Clean fill material was spread over the disposal area from 0.3 to 1.0 meters (1 to 3 feet) to achieve surface radioactivity levels acceptable at that time. In 1973, the U.S. Government and the City of St. Louis agreed to transfer ownership of SLAPS by quitclaim deed from AEC to the St. Louis Airport Authority.

A Federal Facilities Agreement (FFA) (DOE 1990) was negotiated by the U.S. Environmental Protection Agency (EPA) [Region VII] and United States Department of Energy (DOE) in 1990. That agreement describes the process that will be used to remediate all the St. Louis Site and lists the responsibilities of each agency. Two properties within the St. Louis Site are on the National Priorities List (NPL) (SLAPS and Hazelwood Interim Storage Site (HISS)/Futura Coatings); therefore, all the St. Louis sites will be addressed in accordance with the procedures developed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Radiological and chemical characterization surveys and field investigations were conducted at the St. Louis sites from 1977 through 1992 to determine the nature and distribution of radiological and chemical contaminants and to characterize the geological and hydrogeological features.

The primary purpose of this action is to restrict the release of contaminated materials from the site thereby minimizing the potential for associated impacts to human health and the environment. Specifically, the objective is to eliminate the potential for migration of contaminated materials from these properties to offsite soils, surface water, groundwater, or air. As a result, it will be necessary to contain, immobilize, or remove onsite sources of the contaminated materials. A secondary objective of this action is to restore these properties to the owners for their use. Therefore, the scope of this action includes addressing the contaminated soils on these properties that potentially could contribute to offsite migration and/or preclude productive use of the property.

Three alternatives are assessed by this document. CERCLA requires the no-action alternative (Alternative 1) as a baseline against which other alternatives may be compared. Alternatives 2 and 3 evaluate the excavation of SLAPS and the Ballfields. Alternative 3 considers

the placement of excavated soils that are below the cleanup criteria back into the excavation at SLAPS. Below criteria materials are those soils that are below the selected cleanup criteria and require excavation. Alternatives 2 and 3 are assessed against a range of possible cleanup criteria including industrial future use (cleanup criteria A and B) and residential future use (criteria C).

USACE has identified alternative 2C – Excavation and Disposal of SLAPS and the Ballfields as the preferred alternative. Based on extensive public input, this alternative is consistent with the anticipated final remedy for the site. Public input was received by USACE to ensure that the remedial action selected is an effective solution and meets the needs of the local community. USACE has responded to all significant comments submitted during the public comment period. After considering these comments, this final EE/CA includes a response summary to public comment.

The proposed removal action could begin in fiscal year 1998, and would continue until the action is completed **or** the ROD for the St. Louis Site is in place. These actions are subject to availability of funding, which is provided annually by Congress.

1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE) is implementing a cleanup program for multiple properties in St. Louis, Missouri. USACE is conducting cleanup activities at these sites under the Formerly Utilized Sites Remedial Action Program (FUSRAP). This program, which currently includes 46 sites in 14 states, was established in 1974 by the U.S. Atomic Energy Commission (AEC), a predecessor agency of the U.S. Department of Energy (DOE). The primary purpose of FUSRAP is to identify and clean up or otherwise control sites with residual radioactive contamination above current guidelines or standards. On October 13, 1997, Congress transferred the FUSRAP program from DOE to the USACE; all future actions at the site will be managed by the USACE. All actions by the USACE at the site are governed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Executive Order 12580, and a Federal Facilities Agreement (FFA) originally negotiated between DOE and the U.S. Environmental Protection Agency (EPA) Region VII that applies to USACE involvement at the site.

The major objectives of FUSRAP are to:

- find and evaluate sites that supported Manhattan Engineer District (MED)/AEC nuclear work and determine whether they need cleanup or control;
- remediate or manage these sites so they meet current guidelines;
- dispose of or stabilize radioactive material in a way that is safe for the public and the environment;
- perform all work in compliance with appropriate federal laws and regulations and comply with state and local environmental laws and land use requirements; and
- certify sites for appropriate future use.

This engineering evaluation/cost analysis (EE/CA) report has been prepared to address interim cleanup measures for the St. Louis Airport Site (SLAPS) and the Ballfields (a SLAPS vicinity property). The scope of the proposed action is to address contaminated materials located on these properties to site-specific levels based on risk consistent with the anticipated future use. Although these materials are not thought to pose an imminent threat to the public or the environment, there is some potential for release of contaminants to the off-site environment. Consequently, the USACE has determined that an expedited response action to address these materials is appropriate to ensure protection of human health and the environment. This document outlines several alternatives for management of this material which would be consistent with the anticipated final cleanup strategy for the site. The public review draft of the EE/CA was released March 5, 1998, and the public comment period extended from March 6, 1998 to April 9, 1998.

Based on the overwhelming preference of local officials and citizens after receipt of public comment, the USACE has identified Alternative 2C as the preferred alternative.

Any action taken under this EE/CA will be a component of the comprehensive cleanup program for the St. Louis FUSRAP sites. Implementation of comprehensive cleanup measures will follow completion of the remedial investigation/feasibility study (RI/FS) process. The RI/FS process will conclude with the issuance of a Record of Decision (ROD) that will identify the selected remedy for all contamination present at the St. Louis FUSRAP site that poses unacceptable risks to human health and the environment. The RI/FS process is being conducted according to the requirements of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA). The proposed removal action could begin in fiscal year 1998, and would continue until the action is completed **or** the ROD for the St. Louis Site is in place. These actions are subject to availability of funding, which is provided annually by Congress.

The analyses presented in this EE/CA demonstrate that the proposed removal action can be implemented in a manner that protects human health and the environment and falls within the CERCLA risk range of 10^{-4} to 10^{-6}. The proposed removal action will be consistent with the anticipated overall cleanup strategy for the St. Louis FUSRAP site.

2. SITE CHARACTERIZATION

2.1 SITE DESCRIPTION

SLAPS, an unincorporated property in St. Louis County, is bounded on the north and east by McDonnell Boulevard, on the south by Banshee Road and the Norfolk and Western Railroad, and by Coldwater Creek on the west as illustrated in Figure 2-1. SLAPS covers 8.8 hectares (ha) (22 acres) and is surrounded by security fencing. The actions described in this EE/CA include areas inside the security fencing at the SLAPS site; adjacent areas; and the Ballfields areas across McDonnell Boulevard (e.g., SLAPS vicinity properties). A water main runs along the northern boundary of SLAPS and a gas line crosses the northwest corner of SLAPS and runs parallel to the property on the north. There are overhead utility lines on the western end of SLAPS.

Coldwater Creek flows for 153 m (500 ft) along the western border of SLAPS. The creek originates 5.8 km (3.6 miles) to the south and continues for 24 km (15 miles) in a northeasterly direction through Hazelwood, Florissant, unincorporated areas of the county, and along the northern edge of the unincorporated community of Black Jack, until it discharges into the Missouri River. The creek, except for the 1.2 miles it travels under the airport, is accessible to the public [Science Applications International Corporation (SAIC) 1992].

2.2 SITE HISTORY

MED acquired SLAPS in 1946 to store uranium-bearing residuals from SLDS from 1946 until 1966. In 1966, these residuals were purchased by Continental Mining and Milling Company of Chicago, removed from SLAPS, and placed in storage at Latty Avenue under an AEC license. After most of the residuals were removed, site structures were demolished and buried on the property along with approximately 60 truckloads of scrap metal and a vehicle that had become contaminated (EPA 1989). Clean fill material was spread over the disposal area from 0.3 to 1.0 meters (1 to 3 feet) to achieve surface radioactivity levels acceptable at that time. In 1973, the U.S. Government and the City of St. Louis agreed to transfer ownership of SLAPS by quitclaim deed from AEC to the St. Louis Airport Authority.

In 1982, a radiological characterization of the ditches to the north and south of SLAPS and of portions of Coldwater Creek [Bechtel National, Incorporated (BNI) 1983] indicated radioactivity levels exceeding DOE guidelines then in effect.

In 1986, a radiological and limited chemical characterization of SLAPS determined that radioactive impacts extended as deep as 5.5 m (18 ft) below grade (BNI 1987). A radiological characterization of airport area properties was subsequently conducted from 1986 through 1990 to further define the extent of radioactive contamination and to evaluate possible disposal alternatives.

One previous removal action has been completed at the west end of SLAPS. Excavation of contaminated soils in the area adjacent to the gabion wall on the eastern bank of Coldwater Creek,

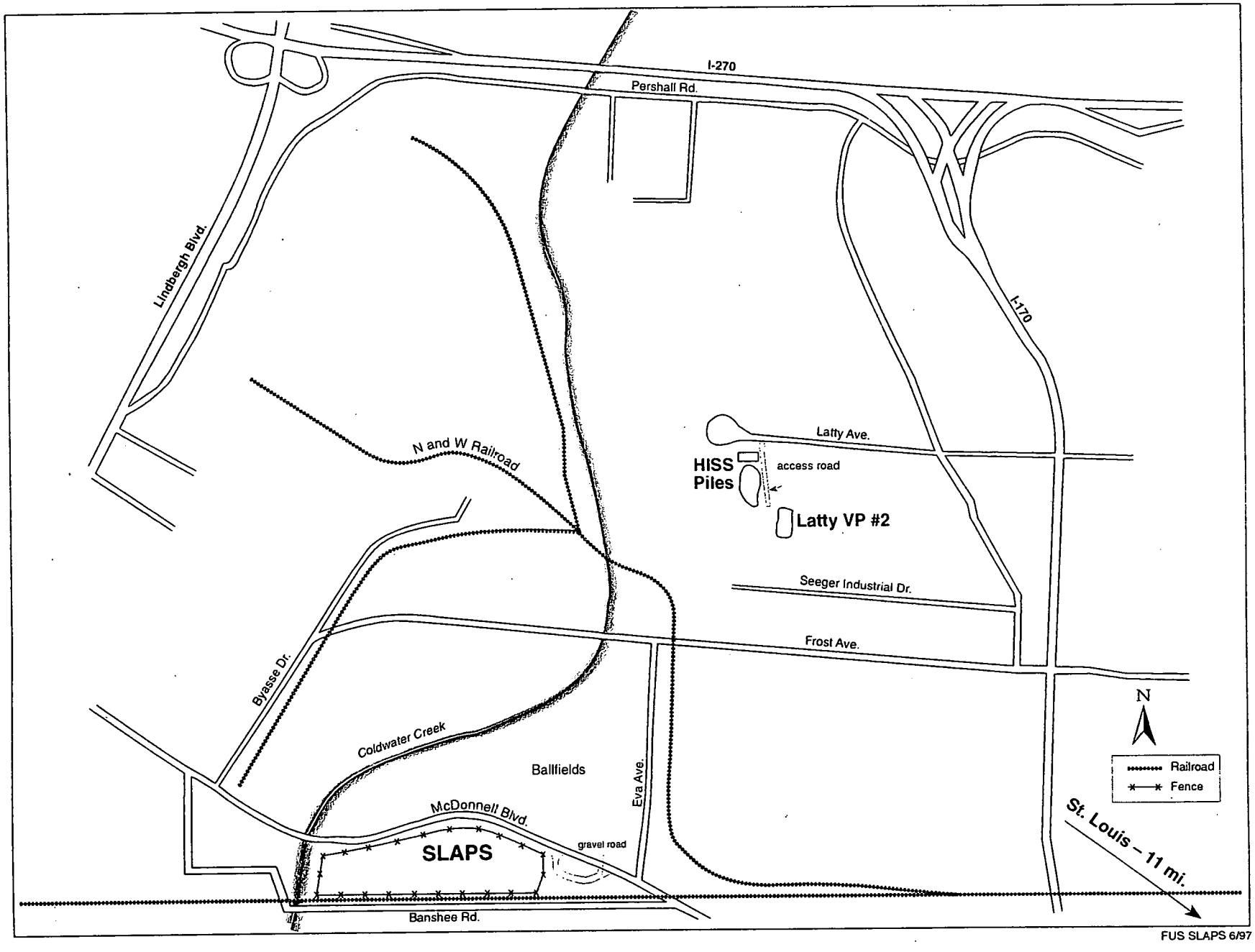


Figure 2-1. Plan View of SLAPS

south of McDonnell Boulevard, began in September 1997. The excavation ran the length of the gabion wall and extended approximately 90 ft to the east. The excavation was accomplished in six discrete units or areas.

Area 1 was located at the southern end of the gabion wall. Area 1 was excavated to the maximum design depth of 13 ft below ground surface. Groundwater was encountered at 12.25 to 13.3 feet below ground surface. Excavation was halted after the design depth was achieved and the watertable was encountered. Radiologically contaminated soils remain below the groundwater table in Area 1. Areas 2 thru 6 were remediated to the cleanup criteria for radionuclides (5/15 pCi/g Ra and Th and 50pCi/g U). Approximately 5,100 cubic yards of contaminated material (insitu) was removed from the west end of SLAPS under this action. Backfilling was completed in December 1997.

2.3 ENVIRONMENTAL SETTING

Land Use and Recreational or Aesthetic Resources

SLAPS and the Lambert-St. Louis airport are owned by the City of St. Louis, but are located in unincorporated St. Louis County. Planning and zoning for SLAPS are governed by the adjacent City of Berkeley. SLAPS is currently zoned "M-1" (Light Industrial). This category allows the full range of light industrial uses, such as building material storage yards, utility substations, wholesale warehouses, and some manufacturing activities. Limited commercial uses include offices, financial institutions, and training academies (Zoning Code, City of Berkeley, Section 23.12.1). The south-central and eastern portions of the property are in the approach zones of runways 17 and 24, respectively, of the adjacent Lambert-St. Louis International Airport (BNI 1994a). This proximity to the airport imposes additional restrictions on the SLAPS property related to noise from aircraft and height restrictions in the approach zones. The portion of the site adjacent to Coldwater Creek is zoned "M-1/FP," which indicates that it is also within the Floodplain District.

The airport area is dominated by industrial uses, but because of its proximity to the airport, more than two-thirds of the land within 0.8 km (0.5 mi) of SLAPS is used for transportation-related purposes. The remaining land is used for commercial and industrial uses, as shown in Figure 2-2. South of SLAPS is the Norfolk and Western Railroad, then Banshee Road, and the Lambert-St. Louis International Airport. West of SLAPS is the creek and then the Boeing Corporation property.

Climatology, Meteorology, and Air Quality

Climatological and meteorological conditions in a region greatly influence the relationship between air pollutant emissions and ambient air quality in the area. The region is dominated by warm, moist maritime tropical air masses, which flow northward from the Gulf of Mexico region, and by colder, drier polar air masses, which drift down from the Canadian Provinces.

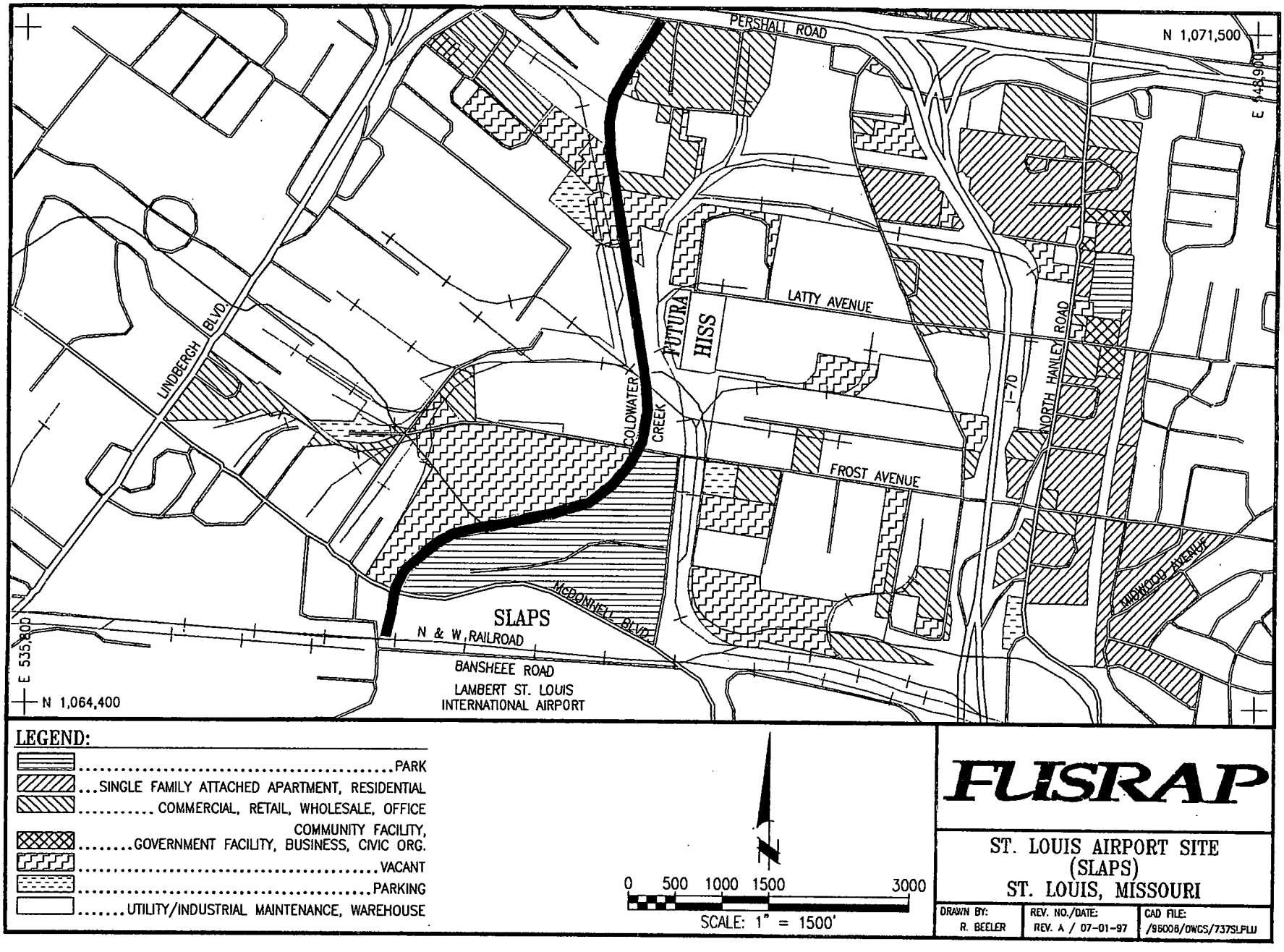


Figure 2-2. Land Use Around Airport

In general, southerly and northwesterly winds dominate the wind regime of the St. Louis region. Southerly winds predominate from May through November, and northwesterly winds predominate from December through April. Normal annual high and low temperatures are 31°C and -5°C (88°F and 23°F), respectively. The area averages 91 cm (36 in.) per year in total (water equivalent) precipitation (i.e., rainfall plus melted snowfall). Average annual snowfall is roughly 66 cm (26 in.).

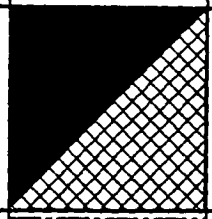
The tornado is the most common form of severe weather observed in this region. From 1916 through 1985, 52 recorded tornadoes occurred in the St. Louis metropolitan area. In 1990, Missouri had 31 storms in 14 storm days, most of them in May and June. Based on the record between 1953 and 1990, Missouri is ranked seventh nationally in the occurrence of tornadoes and averages 11 tornado and 27 storm days per year [National Oceanographic and Atmospheric Administration (NOAA) 1990].

Ambient air quality and the conditions for air emission control are at their worst on summer mornings in the St. Louis area because of the pattern of strong temperature inversions at night. Inversion conditions occur during cool, clear nights under low to calm wind speeds. The resulting dense air trapped near the ground resists vertical mixing and creates poor dispersion conditions.

Geology and Soils

The site stratigraphy at SLAPS (Figure 2-3) is divided into six units: a fill layer, three discontinuous units of nonlithified materials ranging in thickness from 15.2 to 24.4 m (50 to 80 ft), and two undifferentiated bedrock units underlying the non-lithified materials. The top fill layer consists of intermixed rebar, scrap metal, reinforced concrete, glass, and slag within loose to compacted silt, sand, and gravel. The fill layer ranges in thickness from 0 to 4.3 m (0 to 14 ft).

The three units underlying the fill represent nonlithified glacial, lake, and loess sediments. Each unit has an average thickness ranging from 2 to 9 m (7 to 30 ft). The uppermost unit beneath the fill is loess (3T). This subunit (3T) directly overlies subunit 3M. Across the SLAPS area, the 3T subunit varies in thickness from 9 to 27 ft. The next unit is subunit 3M (varved clay and clay), which is approximately 30-ft thick on the western edge of the ballfields, and thins to the east, finally pinching out near the eastern edge of SLAPS. Subunit 3B (silty clay) directly underlies subunit 3M. It is continuous across the SLAPS and thickens towards the east. The results of laboratory soil testing conducted on SLAPS soil are discussed in the Remedial Investigation (RI) report (BNI 1994a). The lower nonlithified unit (Unit 4) is clayey gravel with an increasing amount of fine- to very fine-grained sand and occasional sandy gravel at the contact with bedrock. Bedrock at the site consists of Pennsylvanian sandstones, shales, and siltstones or Mississippian limestone. Depth to bedrock ranges from 16.5 m (55 ft) on the east side of SLAPS to a maximum of 27 m (90 ft) toward Coldwater Creek.

Period	Epoch	Stratigraphic Unit	Columnar Section	Thickness (ft.)	Description
Quaternary	Holocene	FILL/TOPSOIL		0-14	**UNIT 1** Fill - Sand, silt, clay, concrete, rubble Topsoil – Organic silts, clayey silts, wood, fine sand.
	Pleistocene	LOESS (CLAYEY SILT)		11-32	**UNIT 2** Clayey silts, fine sands, commonly mottled with iron oxide staining. Scattered roots and organic material, and a few fossils.
		GLACIO-LACUSTRINE SERIES: SILTY CLAY		19-75 (3) 9-27 (3T)	**UNIT 3** Silty clay with scattered organic blebs and peat stringers. Moderate plasticity. Moist to saturated. (3T)
		VARVED CLAY		0-8	Alternating layers of dark light clay as much as 1/16 inch thick (3M)
		CLAY		0-26	Dense, stiff, moist, highly plastic clay. (3M)
		SILTY CLAY		10-29	Similiar to upper silty clay. Probable unconformable contact with highly plastic clay. (3B)
		BASAL CLAYEY & SANDY GRAVEL		0-6	**UNIT 4** Glacial clayey gravels, sands, and sandy gravels. Mostly chert.
PENNSYLVANIAN		CHEROKEE (?) GROUP (undifferentiated)		0-35	**UNIT 5** BEDROCK: Interbedded silty clay/shale, ignite/coal, sandstone, and siltstone. Erosionally truncated by glaciolacustrine sequences.
MISSISSIPPIAN		STE. GENEVIEVE (?) LIMESTONE		10+	**UNIT 6** BEDROCK: Hard, white to olive, well-cemented, sandy limestone with interbedded shale laminations.

Source: BNI 1993

FUS St Louis 06/97

Figure 2-3. Site Stratigraphy at SLAPS

Surface Water

Coldwater Creek, which empties into the Missouri River at river mile 7 (Creek Mile 0) is the primary surface water feature in the airport area. Although Coldwater Creek is not used for drinking water, two municipal water intakes are located on the Mississippi River, approximately 8.1 km (5 mi) downstream of where the Missouri River discharges into the Mississippi River, 22 km (12 mi) from the confluence of Coldwater Creek with the Missouri (BNI 1994a).

The main channel is 31.5 km (19.5 mi) long and has relatively short tributary streams. SLAPS is at creek mile 13.8. At McDonnell Boulevard, which forms the northern boundary at SLAPS, the drainage area is 32 km^2 (12 mi^2) (Hauth and Spencer 1971). Coldwater Creek, which originates south of SLAPS, generally flows north between the cities of Overland and Florissant, and then east to the Missouri River (Figure 2-4). The total watershed area of Coldwater Creek is 47 square miles (mi^2). The Missouri River watershed is 529,350 mi^2. The annual average flow rate of Coldwater Creek is 41 cubic feet per second (cfs), which is equivalent to 100 million L/day (66 million gal/day).

Coldwater Creek is classified as a Class "C" waterway, which means that there are periods when there is no flow in the creek, but permanent pools are always present. Flooding in Coldwater Creek occurs annually. Coldwater Creek is protected for livestock/wildlife watering and aquatic life usage.

The water quality in Coldwater Creek is generally poor. Pollutants enter the stream in storm water from commercial and industrial facilities, residential areas, and the Lambert-St. Louis International Airport. SLAPS runoff also flows into Coldwater Creek. Six facilities permitted under the National Pollutant Discharge Elimination System (NPDES) program discharge directly into the stream. These facilities include three industrial facilities, which discharge cooling water; two small non-industrial sewage treatment facilities; and the large regional Coldwater Creek sewage treatment plant. USACE currently holds a NPDES permit to discharge stormwater from HISS. Recent studies of aquatic life indicate that the stream ecology is severely impacted. The stream has been severely impacted by salt, oil, antifreeze, jet fuel, etc., in stormwater runoff and in addition, high ammonia levels and low levels of dissolved solids have been detected downstream from the sewage treatment plant (USACE 1987).

Groundwater

Recharge to the groundwater occurs from precipitation, off-site inflow of groundwater, and creek bed infiltration during high creek stage. Discharge occurs by seepage into Coldwater Creek during low creek stage (BNI 1994a). The vertical flow direction varies across the site and, although not well understood, is influenced by stratigraphic heterogeneity and seasonal fluctuations in recharge and evapotranspiration. The position of the near-surface water tends to be lower in the summer and higher in the winter ranging from less than a meter below existing grade to nearly 3 m below grade.

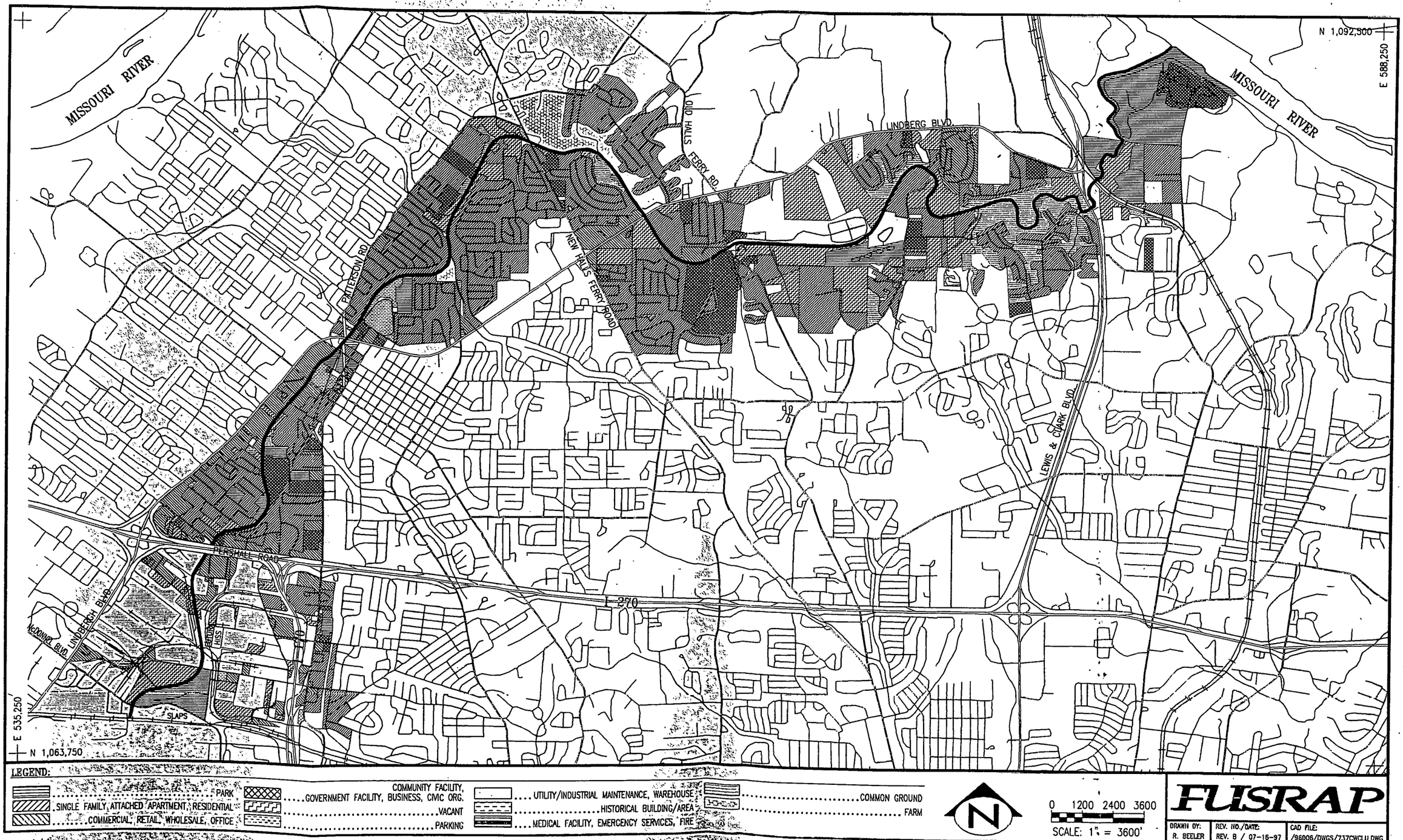


Figure 2-4. Coldwater Creek

Biological Resources

The biological resources description of St. Louis and surrounding areas reflects reconnaissance conducted during daylight hours (0615 to 1630 hours) on May 14 and 15, 1992, and a literature review (primarily Orzell 1979, St. Louis County Department of Planning 1986, and Weston 1979). It covered SLDS, SLAPS, HISS/Futura and vicinity properties, and locations downstream from SLAPS/HISS along Coldwater Creek.

The St. Louis area is located in the Oak-Hickory-Bluestem Parkland section of the Prairie Parkland Province (Bailey 1980) and within the Florissant Basin. Topography is gently rolling with low bluffs north of the Missouri. Presettlement vegetation is characterized by deciduous woodlands intermixed with open prairie (Bailey 1980). The Missouri and Mississippi Rivers are a major influence on the vegetation of the area. Common trees before development included oaks (*Quercus* sp.), hickories (*Carya* sp.), elms (*Ulmus* sp.), sycamores (*Platanus* sp.), cottonwoods (*Populus* sp.), redbuds (*Cercis* sp.), hackberries (*Celtis* sp.), and buckeyes (*Aesculus* sp.) (Bailey 1980). Tall grass prairie species in presettlement times included big bluestem (*Andropogon gerardi*), little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), and prairie junegrass (*Koleria cristata*) (Weston 1979). Today, little presettlement vegetation exists in the area, including at the St. Louis site.

Vegetation at SLAPS as observed in 1992 appears to have changed little since the 1979 Weston survey and is dominated by a grass-forb community that reflects past disturbances. Perennial bromegrass (Bromus sp.) and bluegrass (Poa sp.) appear to be the dominant grasses. Forbs include thistle (Cirsiuim arvense), vetch (Vicia sp.), sunflower (Helianthus sp.), goldenrod (Solidago sp.), and ragweed (Ambrosia sp.). Motts of woody shrubs, including sumac (Rhus sp.), are present on the southern border. Cottonwoods (Populus deltoides) are present on the western border of the creek. Cottonwoods, maples (Acer sp.), and other species of deciduous trees are abundant along the creek north of SLAPS.

Song sparrows (*Melospiza melodia*), swifts, and red-winged blackbirds (*Agelaius phoeniceus)* were the most common birds observed during the May 1992 reconnaissance. Three American goldfinch (*Carduelis tristis*) were seen along the creek woodlands north of SLAPS. In addition, a Mississippi kite (*Ictinia mississippiensis*) was observed hunting in the park and a red-tailed hawk (*Buteo jamaicensis*) was seen perched in a cottonwood just north of SLAPS. Gopher (*Geomys* sp.) holes were numerous, and more than 10 cottontail rabbits (*Sylvilagus* sp.) were observed on SLAPS. Squirrels (*Scirurus* sp.) were observed in the woodlands lining Coldwater Creek. Raccoon (*Procyon lotor*) tracks were observed on mud flats by the creek just north of SLAPS. A pair of mallards (*Anas platyrhynchos*) was observed on the creek approximately 91 m (300 ft) downstream from SLAPS.

Because of the poor water quality from the chemical and physical pollutants in the creek, biological resources in and along Coldwater Creek are less diverse than those of similar creeks in rural areas. No significant amounts of continuous vegetation are found in the watershed, and the quality of the remaining forests is rated "marginal" (Parker and Szlemp 1987). Coldwater Creek is lined with cottonwoods, maples, elms (*Ulmus* sp.), black locust (*Robinia* sp.), box elder

(*Acernequndo*), beech (*Fagus* sp.), and mulberry (*Morus* sp.). Trees intermittently shade the creek, and herbaceous vegetation is composed of vines, forbs, and grasses. The largest vegetated areas occur downstream from the airport area, closer to the mouth of Coldwater Creek.

Previous surveys identified 19 benthic and 6 fish taxa (Nash 1982, Parker and Szlemp 1987). Benthic organisms were dominated by tubificids and chironomids, which are tolerant of organic pollution. Fathead minnows (*Pimephales promelas*) represented 97 percent of the 221 fish collected during a survey (Parker and Szlemp 1987). This species tolerates waters with low oxygen, high temperatures, and turbidity, which characterize much of the creek.

Threatened and Endangered Species

The only federal and state designated, endangered or threatened species that may occur within the area of the proposed action (see Appendix B: U.S. Department of Interior and Missouri Department of Conservation letters) are the pallid sturgeon (*Scaphirhynchus albus*) and bald eagle (*Haliaeetus leucocephalus*). Pallid sturgeon are found in both the Mississippi and Missouri Rivers, but Coldwater Creek does not provide adequate water quality or quantity for them. Bald eagles are known to stay through the winter in the region. It is doubtful that they use the airport area because of poor habitat quality (i.e., sparse vegetation, significant noise and human activity, and limited hunting opportunities along Coldwater Creek).

No sign of these species or their activities was present on the site. The habitat suitable for bald eagles is limited on and near SLAPS (Weston 1979, Parker and Szlemp 1987). In addition, in an unrelated Coldwater Creek Feasibility Study and Environmental Impact Statement conducted by the USACE, the Fish and Wildlife Service stated that it is "highly unlikely" that the proposed USACE project on Coldwater Creek would affect any federally listed species (USACE 1987). As a point of reference, the USACE proposed project outlined in that study involved a substantially greater amount of land clearing and stream bed disturbance than any action that might be taken at SLAPS.

Wetlands and Floodplains

The Fish and Wildlife Service has identified four remnant wetlands, totaling approximately 32 ha (80 acres), along Coldwater Creek between SLAPS and HISS/Futura (Figure 2-5). These wetlands, located on the creek bank, are classified as Palustrine/Forested/Broad-leafed/Deciduous/ Temporarily Flooded. The site visit in May 1992 confirmed that broad-leafed forest communities are present in the wetland areas.

Although soil units mapped along Coldwater Creek between SLAPS and Futura were not identified as typically hydric in the county soil survey, hydric soils can occur in any of the soil associations in St. Louis County. The Nevin-Urban soil association underlying the wetlands along Coldwater Creek can possess hydric properties including poor drainage, mottling, and shallow water table depth. The May 1992 site visit confirmed that the wetland areas have signs of seasonal flooding.

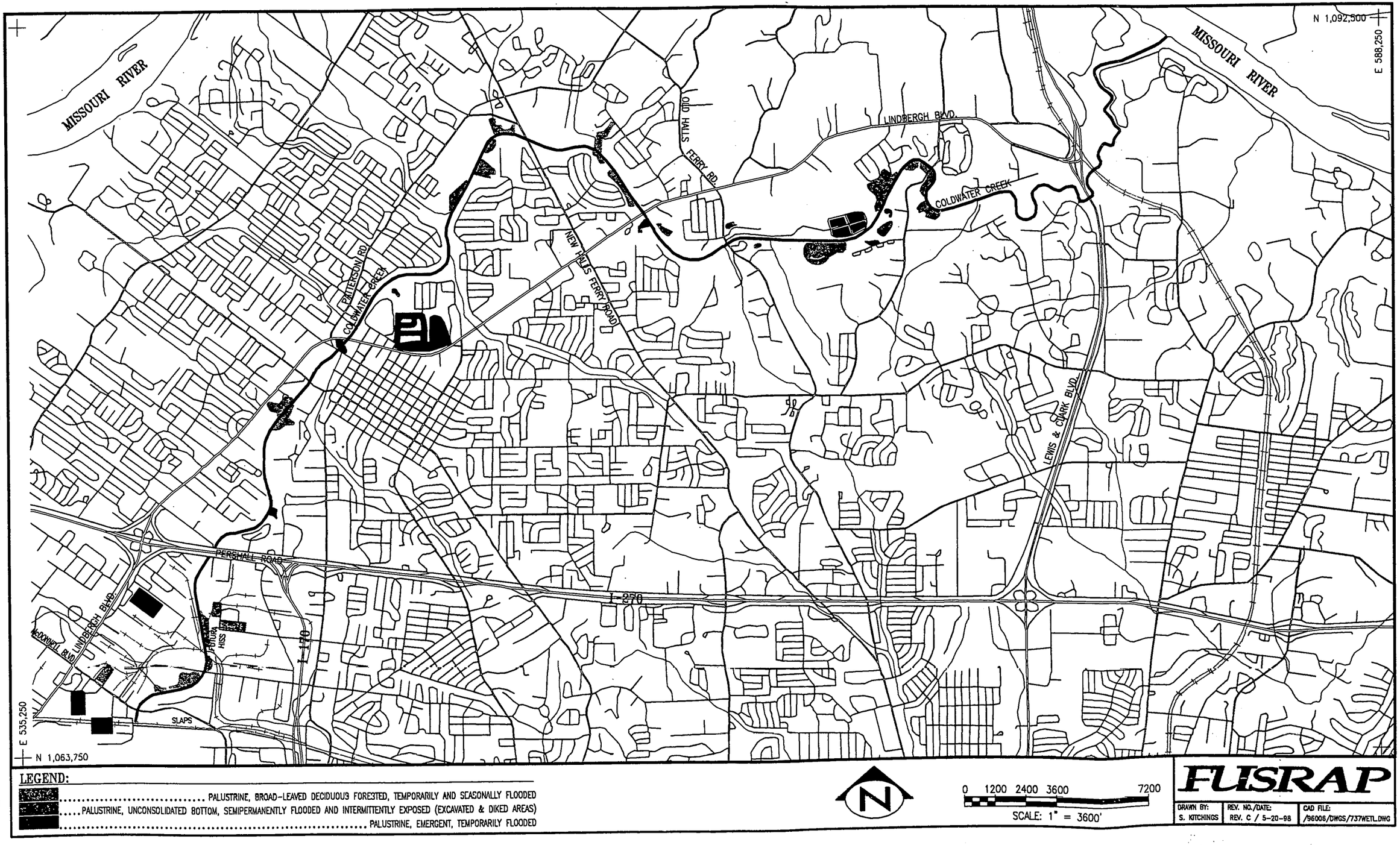


Figure 2-5. Wetlands

The elevation at SLAPS varies from approximately 155 to 161 m (530 to 510 ft) from east to west and land surface ranges from 4.5 to 6 m (15 to 20 ft) above Coldwater Creek (BNI 1992b). Generally, the property surface is flat; however, since the fill placed over the property in the early 1970s was not spread evenly, compaction, revegetation, differential settling, and erosion have created an irregular surface (BNI 1992b). The 100-year flood level at SLAPS is 159 m (522 ft) above mean sea level (MSL) [Federal Emergency Management Agency (FEMA 1983)]. Figure 2-6 shows the extent of the 100-year floodplain at the SLAPS.

If Alternative 2 or 3 is selected as the preferred alternative, a permit for discharge of dredged or fill material into waters of the United States will be acquired in accordance with 33 CFR 323.

Historical, Archeological, and Cultural Resources

No archaeological or historical sites included in the National Register of Historic Places are located within a 1.6 km (1 mi) radius of the airport area. The closest National Register listings are the Meyer House and Daniel Bissell House, located 3.2 km (2 mi) to the north and 6.4 km (4 mi) to the east of SLAPS, respectively. The State Historic Preservation Officer (SHPO) did not identify any known cultural resources within SLAPS (Appendix B, concurrence signature on letter from DOE to SHPO). In addition, SHPO determined that an in-field cultural resource assessment of the site was not warranted because of previous disturbance of the property (Weston 1979).

The Coldwater Creek drainage basin has some archaeological and historical interest. Archaeological discoveries suggest that humans have occupied the region for at least 10,000 years, and 13 prehistoric Indian sites within the basin are registered with the Missouri SHPO (USACE 1987). The Division of Parks and Historic Preservation within the Missouri Department of Natural Resources (MDNR) conducted the most recent archaeological survey (May/June 1985) of the Coldwater Creek drainage basin in order to recover location data concerning prehistoric and historic resources in areas threatened by construction activity. The University of Missouri Archaeological Survey collaborated with MDNR to perform the reconnaissance field work and to prepare the Cultural Resource Survey, which reported the field survey findings.

The reconnaissance survey covered 800 ha (2,000 acres) of portions of the Coldwater Creek drainage basin. Although previous surveys had recorded 34 archaeological sites, development activities in the drainage basin have since destroyed 33 of these sites. Consequently, the 1985 survey concentrated on discovering and defining previously unrecorded resources. Fifty-two new sites were identified. MDNR identified seven camp sites within 0.40 km (0.25 mi) of Coldwater Creek that could be affected by remedial or construction activity along the creek banks (Harl 1992). The closest of these sites is located 6.4 km (4 mi) downstream of SLAPS in the area between I-270 and the New Halls Ferry Road. In addition, MDNR also made 16 isolated finds including both prehistoric and historic remains that were associated with other artifacts. No known archaeological sites are located adjacent to Coldwater Creek between I-270 and SLAPS. This area has been and is being used for industrial and recreational activities. SLAPS has been used as a waste management area in the past.

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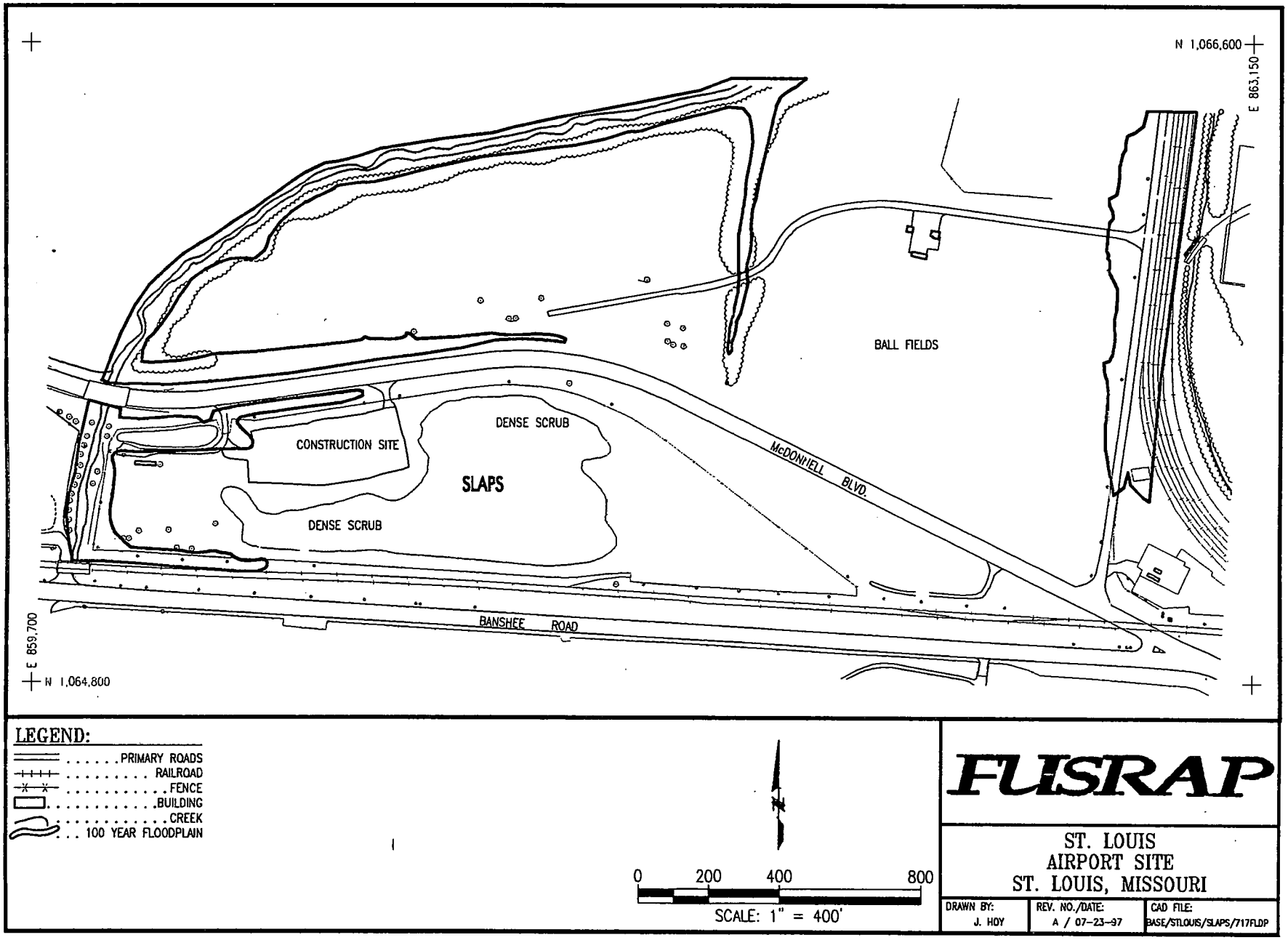

Figure 2-6. 100-year floodplain

Numerous historical sites are located along Coldwater Creek. The most prominent of these historical sites is the City of St. Ferdinand Multiple Resource Area (MRA), which is located approximately 3.4 km (2 mi) downstream of SLAPS and is listed on the National Register. MRA is the oldest settled area in St. Louis County, and it is composed of 124 historically significant properties, dating from 1790 to 1940. Although the area is primarily residential and features 93 single-family dwellings, a small commercial area survives and includes 15 buildings with historical significance. The western portion of the MRA, including the St. Ferdinand Church and Shrine, are located within 0.40 km (0.25 mi) of Coldwater Creek

The St. Ferdinand Central Historic District (hereafter referred to as "St. Ferdinand") is contained within the MRA. St. Ferdinand (now Florissant) has no single period of outstanding historical significance; however, the town illustrates the historical development from the time of Spanish and French colonization, through the German immigration and urban expansion of the nineteenth century, to the present day. St. Ferdinand is located approximately 335 m (1,100 ft) east of Coldwater Creek, and consequently, many of the town's buildings that have been nominated for inclusion on the National Register of Historic Places lay within the Coldwater Creek floodplain (Harl 1992).

The St. Ferdinand's Shrine Historic District is not contained within the St. Ferdinand MRA, but it is regarded as the most prominent of all of the St. Ferdinand historical sites. The shrine is located approximately 61 m (200 ft) east of Coldwater Creek and west of Fountain Creek, and is located within the 100-year floodplain. The shrine buildings mark one of the earliest outposts of the Roman Catholic Church in U.S. territory and are listed in the National Register of Historic Places.

Consultation with the St. Louis County Department of Parks and Recreation revealed another historical site along Coldwater Creek. The Bockrath-Wiese House is located in St. Ferdinand Park approximately 46 m (150 ft) from the creek's eastern bank, 5.3 km (3.3 mi) downstream from the SLAPS. The Wiese House was built prior to 1870 by Henry Bockrath, a German immigrant, and is presently owned by the City of Florissant. Because of its significance as an example of a Missouri-German vernacular farmhouse, it has been nominated for inclusion on the National Register of Historic Places. Activities undertaken pursuant to this Engineering Evaluation/Cost Analysis (EE/CA) will not adversely impact any historic properties.

Environmental Justice

Environmental justice means the fair treatment of people of all races, cultures, and income with respect to the development, implementation, and enforcement of environmental laws and policies. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires all Federal agencies to focus attention on the environmental and human health conditions in minority (specifically Native American) and low-income communities to promote nondiscrimination in federal programs substantially affecting human health and the environment. The Order also requires Federal agencies to provide minority and low-income communities access to information and public participation in matters relating to environmental justice.

Environmental justice impacts from the various alternatives examined in the EE/CA would not consist of disproportionate health risks to minority and low-income populations.

Socioeconomic Impacts

The SLAPS Site is owned by the St. Louis Airport Authority. The proposed removal action at the site would be conducted by USACE contractor personnel, who could include members of the local labor force and personnel temporarily relocated to the site. This activity would be expected to require a relatively small work force, consisting of heavy equipment operators, truck drivers, construction engineers, health and safety personnel, etc. The activities would be overseen by USACE personnel.

No significant socioeconomic impacts would be expected at the off-site commercial disposal facility receiving waste. Since this waste volume is small in comparison to the disposal capacity of commercial disposal facilities, the disposal of this waste stream would not be expected to require significant expansion of personnel resources or facility infrastructure. Because capacity at individual Subtitle C or D landfills may be limited, use of multiple Subtitle C or D landfills could be required to handle the volume of contaminated soil if this disposal alternative is utilized.

Cumulative Impacts

In accordance with the Council on Environmental Quality guidelines, the overall cumulative impact of the proposed action and the consequences of subsequent related actions are to be considered. Cumulative impacts represent the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

As a single action, the proposed removal action would not contribute to significant (negative) impacts on the environment. Engineering controls would be in place to minimize the release of radionuclides into the environment during construction. However, as part of the overall clean up of the St. Louis site, the net impact will be the removal of significant quantities of radionuclides from the area. These materials will be placed in an appropriately licensed or permitted disposal facility. The combined effect of the current and anticipated actions on the St. Louis site would be a reduction of contamination in the environment and a reduction of human risk. A summary of the potential environmental impacts is shown in Table 2-1.

Table 2-1. Summary of Potential Environmental Impacts

	Alternative 2 (A, B, and C)	Alternative 3 (A, B, and C)
Land Use and Recreational or Aesthetic Resources	None	None
Soils and Water Resource	None	None
Air Quality	Short-term	Short-term
Biological Resources	None	None
Wetlands and Floodplains	Short-term	Short-term
Historical, Archeological, and Cultural Resources	None	None

2.4 SITE CHARACTERIZATION DATA

2.4.1 Insitu Soils

An RI was conducted to determine the nature and extent of radiological contamination, and to characterize the geological and hydrogeological features of the St. Louis site. Analytical results for radiological and chemical characterization surveys are summarized in the RI report (BNI 1994a). In addition, the SLAPS property was studied to determine its suitability as the location for an engineered disposal facility for waste from the St. Louis site (BNI 1994b). Radiological characterization included near-surface gamma measurements, downhole gamma logging, and analysis of over 400 soil samples for U^{238}, Ra^{226}, Th^{232}, and/or Th^{230}. Sediment samples from the ditches were also collected and analyzed for the same radionuclides.

The formal environmental surveillance program was discontinued at the end of the second quarter of calendar year 1992. The program was reinstated at the beginning of the third quarter in 1994 and continues. Routine environmental surveillance consisted of periodic measurement of the following: perimeter radon concentrations in the air, potential external gamma radiation exposure at the fence line, upstream and downstream concentrations of radionuclides in surface water and sediment (through 1992), upgradient and downgradient concentrations of radionuclides in groundwater, and measurement of radionuclide constituents in stormwater discharge from the site (since 1994).

Radiological Results

The radiological soil contamination at SLAPS is associated with residual materials present in the fill layer. The fill layer has been defined as the uppermost stratigraphic unit (Unit 1- Figure 2-3) at the site and is composed of topsoil and fill. The composition of the fill is varied and includes ore raffinate, radium-bearing residuals, uranium-containing sand, radioactively contaminated scrap metal, and radioactive scrap materials. Some of the materials were placed in pits dug at the site. The aerial extent of this layer encompasses most of SLAPS with the vertical thickness ranging from 0 to 4.3 m (0 to 14 ft) (BNI 1994a). While most of the residual material was buried in the fill or Unit 1, some material was buried in the underlying loess or Unit 2 (Figure 2-3).

The horizontal and vertical extent of radionuclides in soil is illustrated as the maximum projected sum-of-the-ratios (SOR) distribution for the cleanup criterias evaluated for each alternative. An explanation of the SOR calculation is contained in Appendix C. Figures 2-7 through 2-12 show the horizontal and vertical extent of the SOR distributions. The volume of contaminated soil is shown in Table 2-2. The values presented are based on the SOR calculations for the range of cleanup criteria evaluated and do not include overburden or over excavation.

Chemical Results

Table 2-3 shows the chemical data for SLAPS. The data are based on 90 samples taken in 30 borings drilled in SLAPS. For metals, only the results above U.S. background were reported (BNI 1989). Due to limited available chemical data, it is difficult to draw conclusions regarding the nature or extent of chemical contaminants at SLAPS; however, based on this limited data, there does not appear to be a widespread problem with chemical contaminants. Three organic compounds (toluene, trans-1,2- dichloroethene, and trichloroethene) were detected in a small percentage of the borings that were analyzed for chemicals. There were a total of six target chemicals detected in Toxicity Characteristic Leaching Procedure (TCLP) tests. These are shown in Table 2-4 along with the TCLP limits. Mercury exceeded TCLP limits in one sample out of the 34 TCLP analyses. The sample in which mercury exceeded the maximum allowable concentration was the only sample in which mercury exceeded the detection limit. Selenium was found to exceed the maximum allowable concentration in one sample. It was detected in the leachate of 14 samples with an average concentration of 0.167 mg/L. The maximum allowable concentration for selenium is 1 mg/L. The next highest concentration after the maximum of 1.18 mg/L was 0.411 mg/L. Based on these results, it is not anticipated that this action will generate mixed waste. Additional chemical and radiological characterization data collection will be accomplished to support remedial actions. This data will be used to refine the extent of excavation, determine the presence of mixed waste, and validate waste disposition.

2.4.2 Treatment Characterization/Technology

To provide additional information to evaluate treatment as a remedial alternative at the St. Louis site, treatment characterization and technology screening tests were performed on the North County soils in 1994 and 1995. The results of these tests are presented in this section.

Laboratory Testing

In 1994, RUST-Clemson Technical Center (RUST-CTC), a subcontractor laboratory experienced in radioactive/hazardous soil characterization and remediation, won a competitive contract to perform treatment characterization and technology screening for the St. Louis North County soils. The purpose of the testing was to evaluate the ability of various treatment technologies to provide volume reduction and reduce the costs for remediating the radioactive soils from the North County sites.

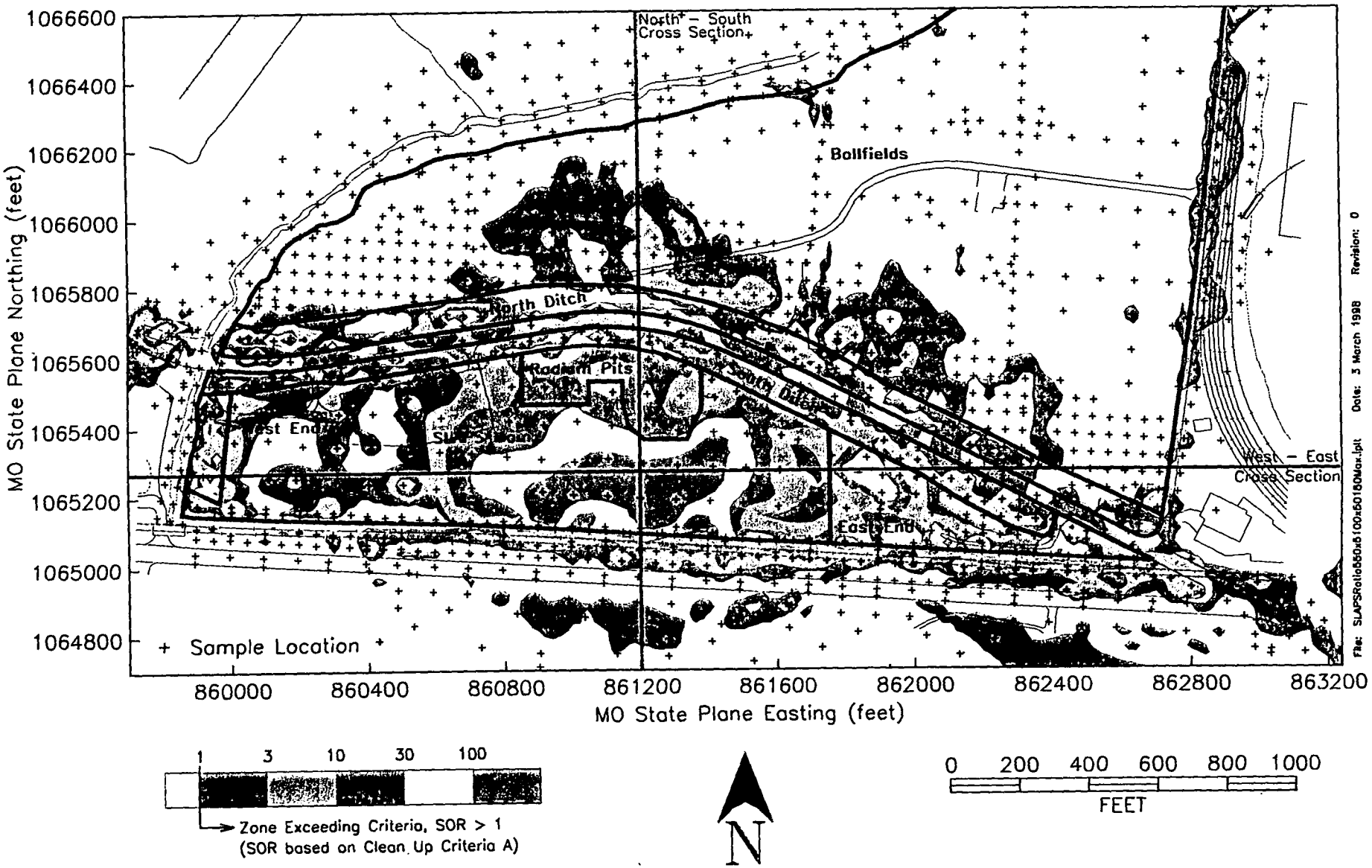

Figure 2-7. SLAPS Maximum Projected SOR Distribution (Cleanup Criteria A)

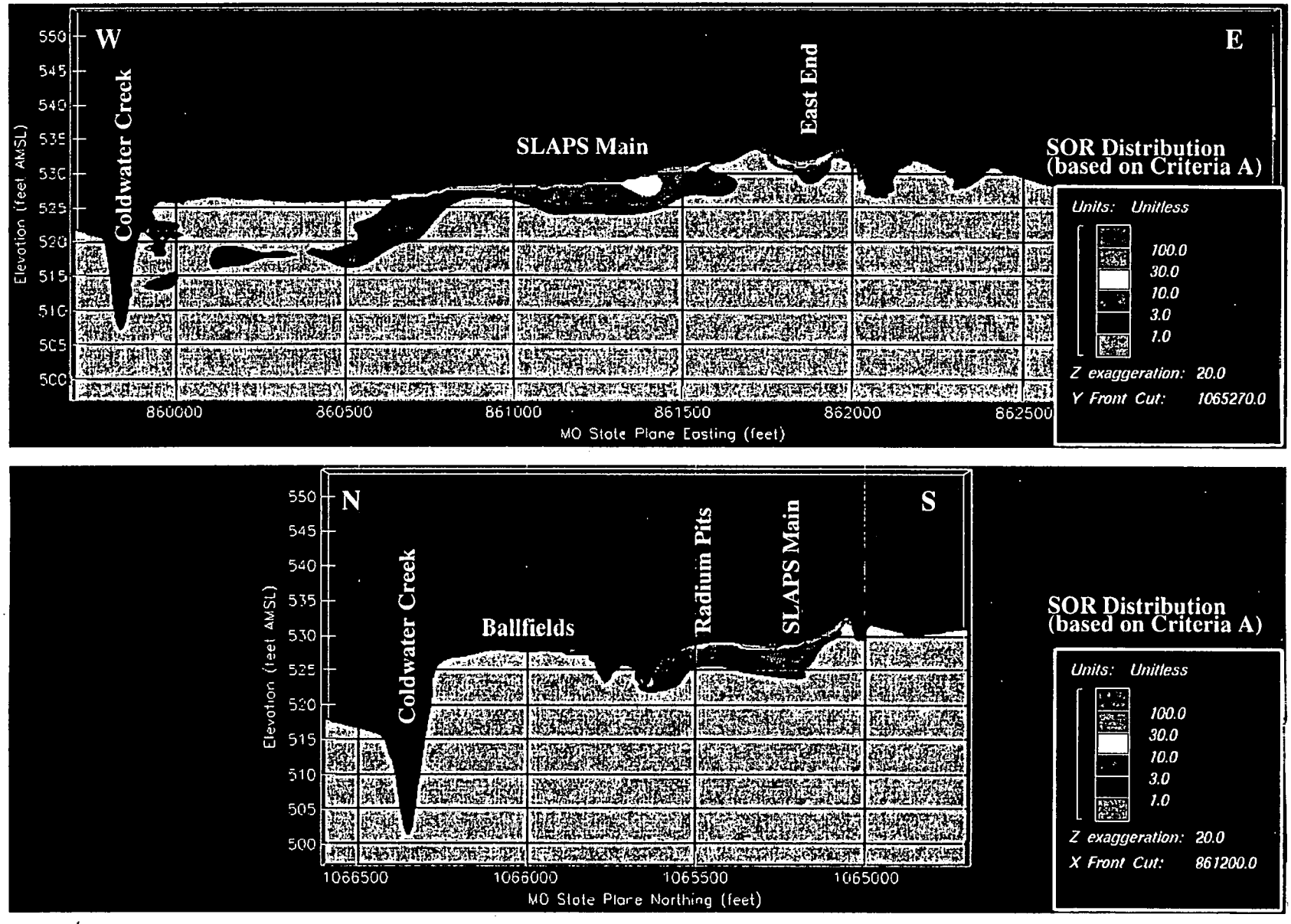

Figure 2-8. SLAPS SOR Distribution Cross-Sections (Cleanup Criteria A)

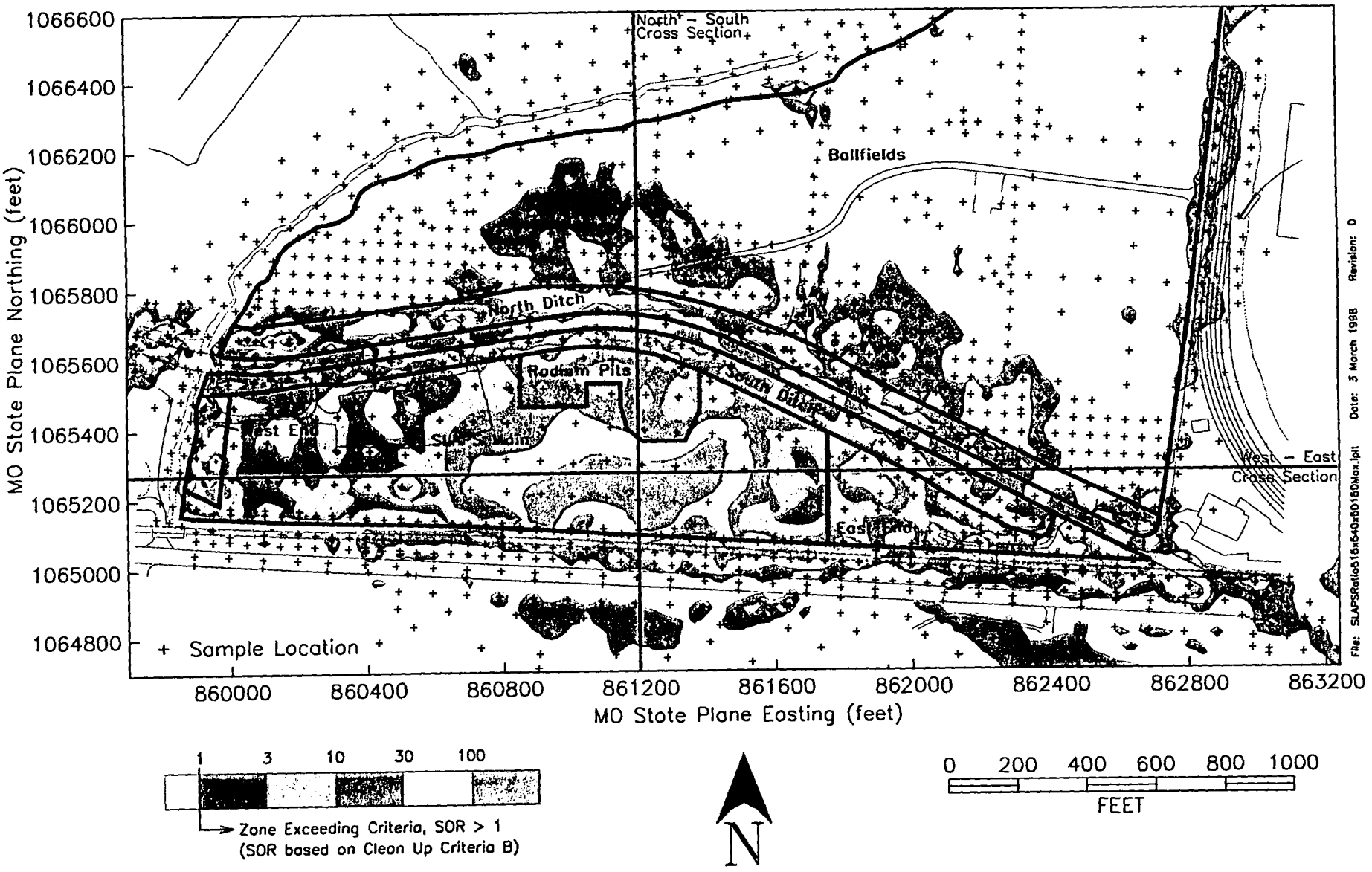

Figure 2-9. SLAPS Maximum Projected SOR Distribution (Cleanup Criteria B)

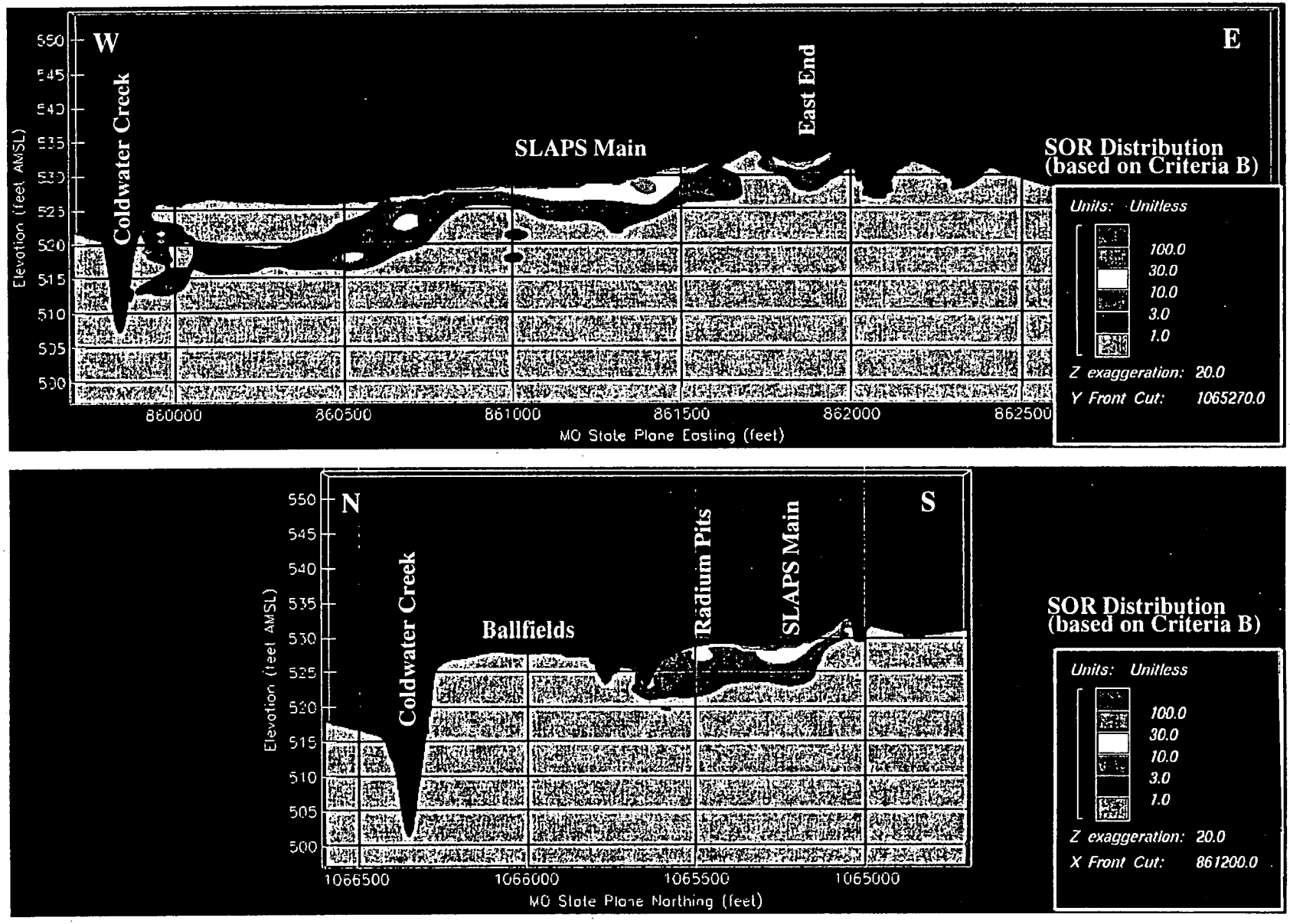

Figure 2-10. SLAPS SOR Distribution Cross-Sections (Cleanup Criteria B)

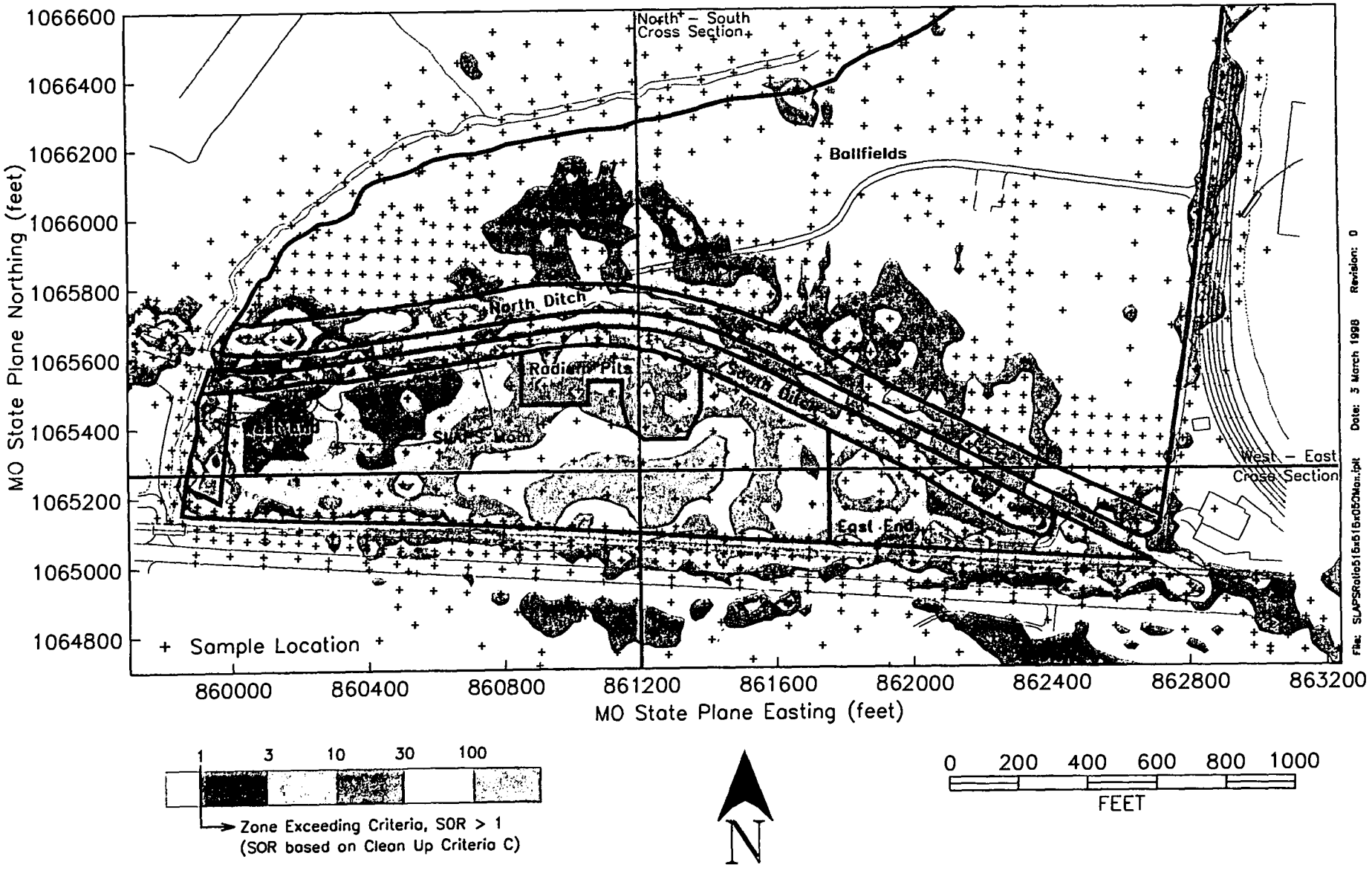

Figure 2-11. SLAPS Maximum Projected SOR Distribution (Cleanup Criteria C)

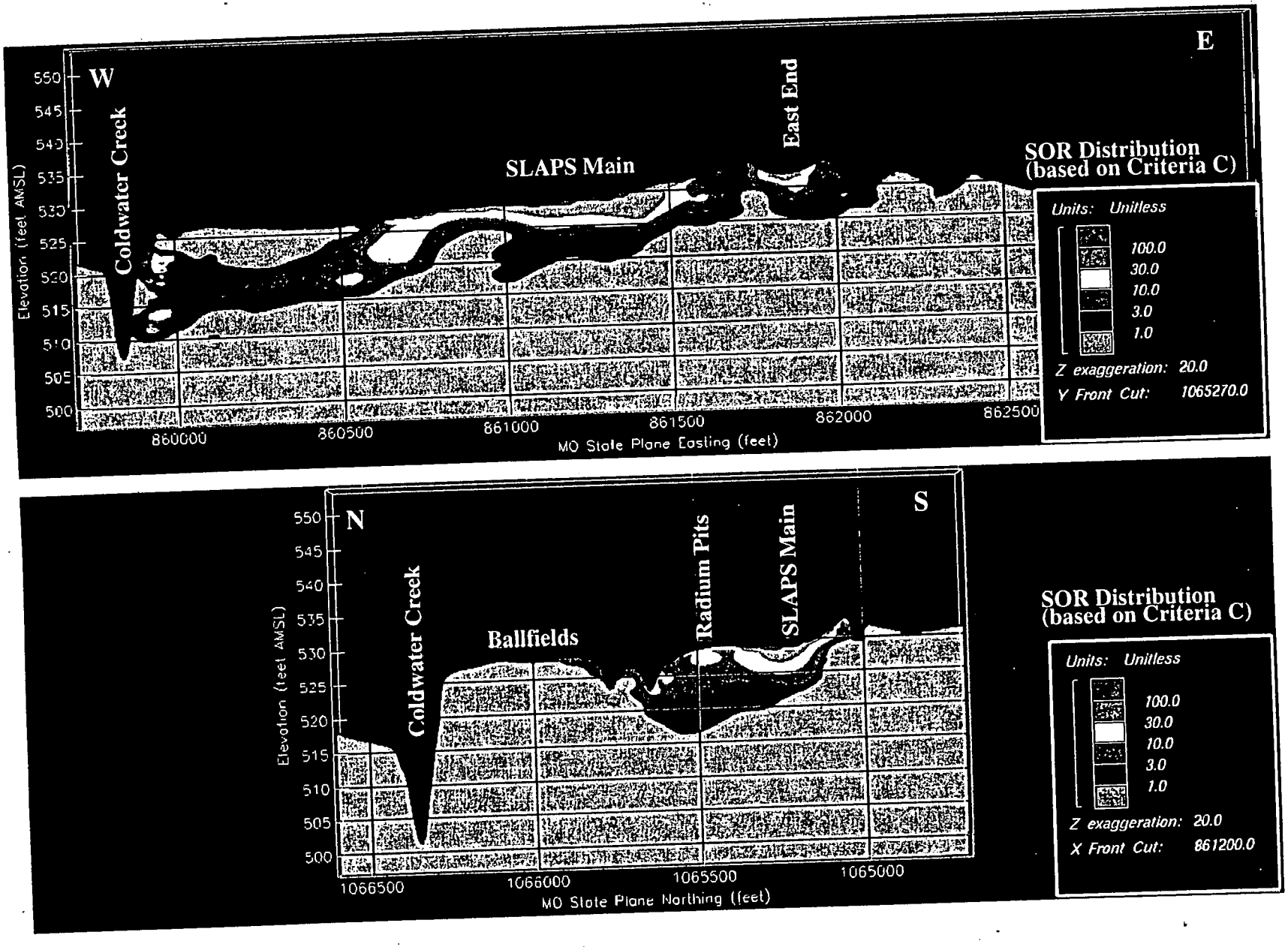

Figure 2-12. SLAPS SOR Distribution Cross-Sections (Cleanup Criteria C)

Table 2-2. Insitu Volumes

	Insitu Volume Above Criteria (cy)	
Cleanup Criteria	Alternative 2*	Alternative 3*
A	107,018	107,018
B	170,909	170,909
C	269,858	269,858

Cleanup Criteria (surface/subsurface- pCi/g):
A – Ra-226 5/50, Th-230 5/100, U-238 50/150
B – Ra-226 5/15, Th-230 5/40, U-238 50/150
C – Ra-226 5/15, Th-230 5/15, U-238 50/50

* includes all of SLAPS within the fenceline, areas between the fenceline and the railroad, areas between the fenceline and McDonnell Boulevard, and the Ballfields excluding the ditch north of McDonnell Boulevard.

Table 2-3. Summary Statistics for Chemical Constituents in Soil at SLAPS

Chemical	Concentration (mg/kg)			Number of Detections Above Background[a] out of 90 Samples	Average Background Concentrations in Missouri Soil[b]
	Mean[c]	Min.	Max.		
Antimony	7.07	53.2	53.2	1	0.52
Arsenic	164.00	50.8	237	3	8.7
Barium	7,140	1,000	13,600	5	580
Cadmium	1.42	1.00	50.4	16	<1.0
Chromium	3240	3240	3240	1	54
Cobalt	654	41.9	6050	23	10
Copper	896	135	4,400	12	13
Fluoride	44.8	32.4	62.9	4	270
Lead	644	268	1,200	6	20
Magnesium	12,100	21	26,900	31	2,600
Molybdenum	21.3	17.7	255	14	<3.0
Nickel	3,890	1,460	7,570	4	14
Selenium	14.1	19.6	183	4	0.28
Sulfate	860	860	860	1	NA
Toluene	102	1.5	1,200	26	
Trans-1,2-dichloroethene	3.4	1.3	7.7	5	
Trichloroethene	5.45	1.6	15	6	
Vanadium	758	630	862	3	69
Zinc	2,490	657	4,330	2	49

[a]BNI 1987. Comparison to background referenced to background reported in *Health and Control Aspects of Coal Conversion* by Braunstein (1981).
[b]ANL 1993. Baseline risk assessment referenced Missouri background to Tidball (1984), except for antimony and thallium.
[c]Average includes nondetects at ½ the detection limit, if reported.

Table 2-4. Summary Statistics for TCLP Results in Soil at SLAPS

Chemical	Concentration (mg/L)			Number of Detections out of 34 Samples	Maximum Allowable Concentration in Leachate (mg/L)
	Mean[a]	Min.	Max.		
Barium	1.52	0.536	3.400	34	100
Cadmium	0.0103	0.0051	0.211	8	1.0
Lead	0.0476	0.135	0.135	1	5.0
Mercury	0.00011	0.43	0.43	1	0.2
Selenium	0.167	0.105	1.18	14	1.0
Heptachlor	0.00009	0.00004	0.00043	8	0.008

[a]Mean includes nondetects at ½ the detection limit, if reported.

A total of 28 samples were collected for the studies from SLAPS, HISS, Latty vicinity properties, Ballfields, Haul Roads, and SLAPS ditches. The 28 samples were evaluated for particle size distribution as a function of isotopic concentration. The primary conclusions about particle size and radionuclide distribution were as follows:

- The soils contain relatively high proportions of fine particles (average of 66 percent fines) and the distribution of radioactivity is highly variable with significant activity measured in most soil size fractions (40 to 90 percent of the total activity and greater than 60 percent of the soil mass were found in the less than 0.38 μm fraction). These data indicated that particle size separation would not achieve volume reduction of the radioactive soil and that other treatment technologies should be evaluated.

- The primary radionuclide of concern was Th-230, as it was present at levels that significantly exceed the cleanup goals. The Th-230 concentrations in the whole soil samples evaluated by RUST-CTC ranged from 3 pCi/g to 1,386 pCi/g (RUST-CTC 1995).

The 28 discrete samples were combined into 7 composite samples for testing of attrition scrubbing, density separation, and chemical extraction processes. The results of the attrition scrubbing tests showed that less than 10 percent of the total activity was removed by the attrition scrubbing process. These data indicate that the radionuclides are not readily solubilized by water alone, nor are they easily abraded away (RUST-CTC 1995). The density separation tests showed that the partitioning of the radioactivity was roughly equivalent to the mass partitioning. These results indicate that little or no benefit would be expected from density separation of these soils (RUST-CTC 1995).

The initial chemical extraction tests evaluated extraction solutions that were known, based on the laboratory experience and literature precedent, to be effective in removing the uranium, thorium, and radium found in the North County soils. These extraction solutions employed chelating agents and complexing/reducing agents to selectively enhance the dissolution of the radionuclides. After several extraction tests, the laboratory determined that selective chemical extraction using ethylenediaminetetraacetic acid (EDTA) and bicarbonate could achieve the cleanup criteria for at least a certain portion of the soils. In the final laboratory confirmation

tests, the three stage EDTA/bicarbonate extraction process reduced the Th-230 concentrations in the composite samples from 488 pCi/g to 18pCi/g (sample LV1C) and 1,594 to 8 pCi/g (sample SL1C) (RUST-CTC 1996).

The remainder of the laboratory tests involved evaluating the downstream secondary treatment processes: slurry dewatering, concentration and recycle of the extraction solution, and waste water treatment and minimization (RUST-CTC 1996).

Based on the test results, RUST-CTC developed a conceptual treatment process design and rough order of magnitude (ROM) cost estimate (RUST-CTC 1996). The ROM cost estimate showed that the multi-stage selective chemical extraction process was not likely to provide a significant cost savings as compared to excavation, transportation, and off-site, out-of-state disposal.

Mineralogical Characterization

In 1995, DOE requested that the U.S. Bureau of Mines Albany Research Center (BOM) investigate the mineralogical characteristics of particle size fractions from six composite samples taken from the St. Louis North County sites. (The composite samples were the same samples taken for testing by RUST-CTC.) The results of their mineralogical characterization studies showed that the radioactive contamination exists primarily in natural heavy minerals and heavy uranium processing products. Radium was not detected by the BOM analysis, but it is likely to be present in the process products (BOM 1995).

The BOM concluded from these studies that the particle size distribution of the soils indicates that physical separation of the radioactivity by physical mineral-processing methods is probably not a viable volume-reduction option (confirming the RUST-CTC conclusions). Screening would be ineffective and gravity separation would be difficult, if possible at all. Chemical extraction offers the best option to successfully reduce the level of contamination in these soils to acceptable levels, but process parameters must be optimized to overcome potential problems such as leachant penetration and solid/liquid separation. The results suggest that additional bench-scale testing would be appropriate to investigate this option (BOM 1995).

Peer Review

To obtain an independent peer review of the St. Louis treatment data, DOE requested that the BOM 1) evaluate the Interim Characterization Report (RUST-CTC 1995) for the North County site prepared by RUST-CTC, and 2) evaluate the conceptual treatment process design and ROM cost estimate for the North County site prepared by RUST-CTC. After reviewing the Interim Characterization Report for the North County soils, the BOM reported that the study was based on a sound plan of investigation and the conclusions were reasonable based on the acquired data. However, the BOM stated that mineralogical and petrographic studies should also be conducted.

The BOM provided several specific comments regarding the conceptual design and cost estimate for the North County soils. However, they generally stated that additional consideration

should be given to materials handling issues given the large amount of very fine material in the soils, and the cost estimate seemed somewhat high based on mineral-processing plants of similar size.

Task Force Evaluation of Treatment

Members of the St. Louis Task Force were briefed on the results of the RUST-CTC laboratory treatment studies as the testing proceeded. The Task Force formed a Technologies Working Group to focus on treatment. Several Task Force members visited the RUST-CTC facility to view their testing and analytical capabilities and discuss the results of the studies.

As part of its participation in the Task Force activities, DOE participated in the Technologies Working Group meetings to discuss the various technologies available for treatment of the St. Louis soils. The St. Louis Site Remediation Task Force Report was published in September 1996. In regards to technology preferences, the Technologies Working Group recommended that DOE 1) further evaluate ex-situ microwave vitrification coupled with gamma ray spectroscopy, laser ablation nebulization spectroscopy, and barrier technology in a field demonstration and 2) evaluate physical soil washing use at the downtown site (Task Force 1996).

In response to the St. Louis Task Force recommendations, DOE issued a Request for Proposals for Demonstration of Technologies to Cleanup the SLAPS. Ten proposals and public abstracts were received on September 26, 1997. An Expert Panel, comprised of representatives for private industry, academia, state agencies, and DOE National Laboratories met September 29, 1997 through October 2, 1997 to assess the proposals. The Expert Panel provided their recommendations to DOE in early October 1997. Since that time, the USACE has decided to cancel the technology demonstration. However, applicable technologies will be evaluated throughout the cleanup of this site.

2.5 STREAMLINED RISK EVALUATION

The streamlined risk evaluation evaluates exposure for possible future uses of the site assuming no cleanup has occurred to determine if cleanup is necessary. This evaluation represents a worst case that assumes the site will be abandoned in its current condition with no restrictions on use. Under those conditions, it has been assumed that the property will be developed as an industrial site considering its proximity to the St. Louis airport and land use in the general vicinity. Groundwater contamination is not within the scope of this removal action, therefore groundwater consumption is not evaluated. A comprehensive study of groundwater will be included in the sitewide feasibility study. The results of this study will be incorporated into the final ROD. The sitewide feasibility study is anticipated to begin in the fall of 1998.

Radiological Risk

Currently, NRC radiological criteria for License Termination found in 10 CFR Part 20, Subpart E, specifies a limit of 25 mrem/yr Total Effective Dose Equivalent (TEDE) with

implementation of As Low As Reasonably Achievable (ALARA) policies for unrestricted use. An EPA Office of Solid Waste Directive issued August 1997 discusses that radiological cleanup levels at CERCLA sites must achieve risk levels at or below 3×10^{-4} to be considered protective.

The predicted dose to a maximally exposed future industrial worker at SLAPS (in the absence of cleanup) is approximately 290 mrem/yr, excluding radon. This dose estimate is twelve times the NRC decommissioning limit of 25 mrem/yr. The estimated risk to the industrial worker, corresponding to a dose of 25 mrem/year, is approximately 2×10^{-3}, therefore, above the EPA risk limit of 3×10^{-4}. At the ballfields, the maximum estimated non-radon dose to the industrial worker is 8.2 mrem/yr. This dose is below the NRC limit of 25 mrem/yr. The maximum risk from exposure to radiological contaminants at the ballfields is estimated to be 6×10^{-5}. This risk is within the CERCLA risk range.

Chemical Risk

As discussed in Section 2, chemical data for SLAPS and the ballfields are limited resulting in an inability to draw reasonable conclusions on nature and extent. Because radionuclides are believed to drive risk at these properties and due to the limited volume of data, chemical risk was not evaluated. The fact that chemical risk is not estimated in this document does not discount the fact that risks may exist from residual chemical contaminants traced back to MEA/AEC activities in St. Louis. The doses and risks calculated for exposure to radionuclides are, however, sufficient alone to show the necessity for site cleanup without introducing highly uncertain chemical risk estimates.

The streamlined risk evaluation indicates that cleanup action is necessary at the site to reduce the on-site dose and risk to within acceptable limits. Details of the risk evaluation calculations are provided in Appendix C.

3. IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

This section identifies the statutory authority for the removal action, defines the scope of the removal action, and states the objectives to be achieved by the removal action.

3.1 STATUTORY LIMITS ON REMOVAL ACTIONS

Authority for responding to releases or threats of releases from a hazardous waste site is addressed in Section 104 of CERCLA. Executive Order 12580 delegates to Department of Defense (DoD) the Section 104 response authority for FUSRAP sites. The USACE is authorized to undertake such investigations, surveys, testing, or other data gathering deemed necessary to identify the existence, extent, and nature of the contaminants present at the St. Louis FUSRAP site, including the extent of threats to human health and the environment. In addition, the USACE is authorized to undertake planning, engineering, and other studies and investigations appropriate to directing response actions to prevent, limit, or mitigate potential risks associated with the site. Removal actions which are appropriate prior to implementation of the final remedial action for the site may be authorized by DoD, as necessary, in accordance with CERCLA.

3.2 SCOPE AND PURPOSE

The scope of the removal action can be broadly defined as management of radioactive and chemical contamination present in soils at the SLAPS and the Ballfields properties. The primary purpose of the proposed action is to restrict the release of contaminated materials from the site thereby minimizing the potential for associated impacts to human health and the environment. Specifically, it is desired to eliminate the potential for migration of contaminated materials from these properties to offsite soils, surface water, groundwater, or air. As a result, it will be necessary to contain, immobilize, or remove onsite sources of the contaminated materials. A secondary objective of this action is to restore these properties to beneficial use. Therefore, the scope of this action includes addressing the contaminated soils on these properties that potentially could contribute to offsite migration.

3.3 SCHEDULE

The proposed removal action for the contaminated soils could begin during fiscal year 1998, and will continue until the action is completed or the ROD for the St. Louis site is in place. Action at the SLAPS and the Ballfields properties may continue under the ROD. The actions to be taken in accordance with this EE/CA are subject to the availability of funding, which is provided annually by Congress.

3.4 COMPLIANCE WITH REGULATORY REQUIREMENTS

In a removal action under CERCLA, legally applicable or relevant and appropriate requirements (ARARs) need to be attained only to the extent practicable. The extent practicable is to be determined considering the urgency of the situation and the scope of the removal action.

An applicable requirement is a clean up standard, standard of control, or other substantive environmental protection requirement, criterion, or limitation promulgated under federal or state law that specifically addresses a hazardous substance, pollutant, remedial action, location, or other circumstance at a CERCLA site.

A relevant and appropriate requirement is a clean up standard, standard of control, or other substantive environmental protection requirement, criterion, or limitation promulgated under federal or state law that, while not applicable to the situation, addresses problems or situations sufficiently similar to those encountered at the CERCLA site that its use is well suited to the particular site. A requirement must be both relevant and appropriate to be an ARAR. A requirement is relevant if it addresses a problem similar to that at the site. A requirement is appropriate if it is well suited to the circumstances of the release and the site.

In addition to ARARs, some guidelines or standards that have not been written into law may also have a direct bearing on the proposed action. These are identified as "to-be-considered" (TBC) requirements.

Requirements that may apply to this proposed action are presented in Appendix A. The identification of ARARs for the proposed action is based on the nature of the radioactive compounds (primarily soils containing radionuclides), the location of the property, and the specific actions to be taken at the site.

CERCLA requires that remedial actions conducted under the RI/FS process meet a 10^{-4} to 10^{-6} risk range. Although the actions outlined in this EE/CA are for a removal action, not a remedial action, the CERCLA risk range will be fulfilled under all of the proposed alternatives except for the no action alternative. EPA recently outlined their guidelines for cleanup of radiologically contaminated CERCLA sites in an Office of Solid Waste guidance directive. Although not a promulgated standard, the directive, which specifies a 15 mrem/year exposure limit for release without radiological restrictions, is considered TBC guidance for this removal action.

4. REMOVAL ACTION TECHNOLOGIES AND ALTERNATIVES

This section summarizes the procedures and rationale used to identify alternatives for conducting the proposed removal action. It will consider relevant technologies that could be implemented to achieve the removal action objectives specified previously. This process is consistent with the NCP and EPA guidance regarding removal actions. The technologies considered in selecting removal action alternatives include those identified in the NCP along with experience and information gained as a result of planning and implementing removal actions at similar sites.

4.1 TECHNOLOGY IDENTIFICATION AND SCREENING

Technologies potentially applicable to the proposed removal action have been screened and evaluated on the basis of site-specific conditions at SLAPS. The objective of the proposed removal action is to ensure protection of human health and the environment and to facilitate preparation of the property for development to benefit the community.

General response actions that may apply to this removal action include institutional controls, containment, removal, treatment, interim storage, transportation, and disposal. Within each of these general response action categories, there may be several technologies which could be used. In turn, each technology may have several options. For example, when using the technology of institutional controls several options (such as deed restrictions, access restrictions, and monitoring) can be identified. Technologies which have already been implemented at SLAPS and are currently in place such as access controls are considered a part of the no-action alternative. Alternatives for the proposed removal action were developed by considering applicable technologies in accordance with the guidelines of the NCP. These technologies were screened with regard to effectiveness, implementability, and cost and then compared to determine tradeoffs among the alternatives.

4.1.1 Institutional Controls

Institutional controls are measures that prevent or minimize public exposure by limiting access or use of impacted areas. They may include physical barriers (such as fences), land use or deed restrictions, and environmental monitoring. Such controls are not effective in reducing the toxicity, mobility, or volume of radiological constituents, but they may reduce the exposure potential. The NCP specifies that institutional controls may not be used as a substitute for active response measures as the sole remedy unless active measures are determined not to be practicable. Costs associated with institutional controls are generally low.

Institutional controls are currently in place at SLAPS and are considered generally effective in limiting potential exposure to the contaminated materials at the site until further action is taken in the near term. Institutional controls are therefore considered as a component of the no action alternative for the purposes of this analysis. Deed and land use restrictions are retained as a

potential component of the other alternatives if materials exceeding the radiological criteria are left on site.

4.1.1.1 Access Controls

Controlling site access involves temporary or permanent physical restrictions that prevent or reduce exposure to contaminated materials at the site. Potential methods of controlling access include warning signs, entry control, barriers such as fences, and active surveillance.

4.1.1.2 Deed and Land Use Restrictions

Land use and deed restrictions can prevent or reduce exposure to contaminated materials remaining on site by using administrative actions that control the types of activities allowed at the site. For example, the land may be zoned and used for industrial use only. Deed restrictions may also be designed to permanently prohibit specific activities such as excavation or subsurface construction on a site that contains contaminated materials after remedial work is completed.

4.1.1.3 Monitoring

An environmental monitoring program is in place at SLAPS. Environmental surveillance activities include monitoring for both chemical and radiological constituents in groundwater, surface water, and sediments. In addition, gamma radiation and radon are measured. These monitoring results are compiled and reported annually.

4.1.2 Containment

Containment technologies are designed to keep contaminated materials at their current locations. The purpose of containment is to reduce mobility and the potential for radioactive materials to move offsite. However, these technologies do not remove, destroy, or immobilize the materials and if containment measures fail, the materials may begin to migrate from the site. Costs associated with containment technologies are considered moderate.

More permanent containment technologies that could be implemented at the site include capping with a low permeability material such as clay. Subsurface barriers could also be installed at the site to eliminate groundwater flow through contaminated materials.

Containment technologies such as dust suppression and erosion control that constitute best management practices would be used as components of the removal alternatives. These technologies would be used during activities that disturb contaminated soil. These technologies are intended to inhibit migration of materials by wind and water erosion during construction activities. These technologies along with grouting and subsurface barriers are retained as potentially applicable containment technologies.

4.1.2.1 Capping

Capping is a containment technology that places surface barriers over impacted soils and buried materials in order to reduce the amount of water that infiltrates through the waste. Reducing the amount of infiltrating water deters the migration of contaminated material into the groundwater. However, capping is not an effective technology where source materials are in direct contact with the groundwater. Caps also effectively stop wind and water erosion, control release of vapors, and limit both direct and indirect exposure to radiation.

Cap designs often have multiple layers that serve different functions. Surface layers generally have the function of controlling wind and water erosion of the cap. This layer is usually a vegetative layer. Lower layers are designed to be capillary breaks which attract and hold water, high permeability horizontal drainage layers which drain water, barriers to prevent plant and animal intrusion, and low permeability layers to prevent contact of water and waste.

Cap designs generally incorporate several of these layers of materials to minimize infiltration of water. The cap surface often has a gradual slope that minimizes puddling but does not create excessive erosion. The selection of the cap design and materials depends on the nature of the waste to be covered, the function of the cap, the local climate and hydrogeology, the availability of materials, the intended use of the capped area, and the required design life.

One simple cap design is the placement of synthetic membranes over contaminated materials. These membranes can be very effective in preventing wind/water erosion and water infiltration. However, membranes exposed to sun, wind, temperature extremes and sunlight are susceptible to degradation and require maintenance and repair. In addition, membranes do not substantially reduce external gamma radiation. Therefore, this capping strategy is generally only used to temporarily cover waste piles of contaminated materials awaiting treatment or final disposal. Most capping strategies utilize a multi-layered design to improve overall performance.

Properly designed caps can greatly reduce infiltration rates and can have anticipated design lives of over 1,000 years. Variations include soil or clay caps, asphalt, concrete, or multi-layered caps.

Based on the presence of source materials in direct contact with groundwater and the future industrial use of this site, capping is eliminated from further consideration.

4.1.2.2 Subsurface Groundwater Barriers

Vertical cutoff walls are a containment technology that places a low permeability barrier in the groundwater aquifer to control the flow of groundwater. These barriers may be constructed downgradient from a groundwater plume to contain impacted groundwater emanating from the site, or upgradient from contaminants to divert groundwater flow away from the site.

Part of the overall design effort includes decisions on how to handle changes in the aquifer created by the placement of the wall. For example, groundwater flow impeded by placement of

the cutoff wall can alter groundwater flow patterns. Possible negative effects of altered groundwater flow should be carefully considered when implementing this strategy.

Vertical cutoff walls can be constructed in several different ways. The type of barrier chosen depends on the size and shape of the required wall, the aquifer soil type, local material availability, wall permeability specifications, and the required design life. The types of contaminants present and the groundwater composition can also limit material choices. General categories of vertical cutoff walls include soil-bentonite slurry walls, cement-bentonite slurry walls, vertically installed synthetic membranes, soil mixed walls, soilcrete/jet grout barriers, and metal sheet piles.

The soil-bentonite slurry walls are an excavation and replacement technology where the excavated material is continually replaced with a bentonite slurry. This slurry serves to maintain trench stability and also creates a low-permeability filter cake on the trench walls. The trench is then backfilled with soil. The permeability of the slurry wall will generally be 1×10^{-7} cm/sec to 1×10^{-6} cm/sec. Wall depths of 50 feet or less may be excavated with ordinary backhoes. The completed slurry trench is usually capped with soil, asphalt, or concrete.

The cement-bentonite slurry wall is similar to the soil-bentonite wall except that the excavated trench is backfilled with a cement/bentonite mixture. This hardens as a result of the cement content and provides the barrier with strengths equal to or exceeding the existing soils. This increased strength allows walls to be constructed in areas with slopes, difficult soil conditions, or with nearby structures. If contaminated soils are excavated to create the slurry wall, disposal of these soils is required. Cement-bentonite slurry walls are also more expensive and generally not as effective as soil-bentonite walls.

Synthetic membranes can be used in conjunction with slurry walls if gas barriers above the groundwater table are required. These membranes help improve the integrity of slurry walls above the water table where drying effects may produce cracks and fissures.

Soil-mixed walls use crane-mounted drills to mix the soil with an engineered slurry. As the drilling continues through the soil, slurry material is continuously injected into the soil. A column of solidified material results with a diameter approximately equal to the diameter of the original drilling auger. A new column is then formed adjacent to and slightly overlapping the previous column. The process is repeated until a wall of the desired length is constructed.

Jet grout barriers are constructed by drilling a small diameter hole (approximately 5 cm) to the design depth using a high velocity jet of air or water. Slurry material is then pumped out through high-pressure jets located near the bottom of the drill pipe. The grout mixes with the soil and forms a cylindrical column of solidified soil. The diameter of the column is a function of several factors including soil composition, jetting pressure speed, nozzle diameter, processing rate, and the slurry composition. Once the column is completed, placement of subsequent adjacent drill holes in the same manner allows formation of the subsurface wall.

The main advantage of jet grouted cutoff walls over mixed walls is that injection wells can be drilled in tight places at any angle. This allows cutoff walls to be constructed near and under surface structures. Processing rates for jet grouting techniques tend to be slower, making the soil mixed walls more cost effective.

A sheet pile cutoff wall consists of interlocked 15 to 20 inch-wide metal sheet piles. The piles are interlocked at the surface and driven into the ground. Piles are available in lengths of 4 to 40 feet. When first placed in the ground, the sheet pile wall is relatively permeable because of the seams. Over time, fine soil particles are washed into the seams and the wall becomes more effective. Rocky soils limit the applicability of this type of cutoff wall because driving the piles through rocks is difficult and excessive driving forces will damage the piles.

The surface and subsurface conditions at SLAPS should pose no barriers to construction of any of these process options. However, costs to construct these barriers varies. The need for groundwater barrier control may develop during the implementation of this action. Groundwater subsurface barriers using a variety of methods is retained as a possible component of the action alternatives.

4.1.2.3 Dust Suppression

Dust suppression technologies are designed to reduce air emissions of dust by preventing wind suspension of soil particles. The dust suppression technologies considered here either change the nature of the surface soils to make them less susceptible to wind erosion or cover the soil to prevent soil-wind interactions.

Temporary wind erosion prevention techniques include application of water, mulches, aqueous emulsions of organic polymer, specialty foams, or anhydrous salts. These technologies all increase the soil moisture content which tends to agglomerate small particles at the surface and make them less susceptible to erosive wind forces. Application of water is the most economical short-term dust suppression method. However, application of water may leach surface constituents and potentially spread contamination if the water infiltrates to lower soil layers. Mulches of grass and hay help suppress dust generation by reducing evaporation rates and maintaining soil moisture content. Aqueous emulsions of organic polymers, or specialty foams have higher viscosities and infiltrate less than water which reduces leaching and infiltration concerns. These materials also require less frequent applications than water. Powdered or granulated anhydrous salts including calcium chloride, sodium carbonate, and magnesium sulfate are also used as dust suppressants. These hygroscopic salts absorb moisture from the air which increases the soil moisture content and reduces dust generation.

Temporary surface covers include various types of synthetic membranes. Synthetic membranes, also called flexible membrane liners (FML), are used to cover soils and other materials to prevent wind erosion. FMLs are available in a wide variety of materials and can be reinforced with fabric or scrim. Selection of the membrane is based on compatibility with soil constituents, site climate, and required design life.

4.1.2.4 Erosion Control

Erosion control technologies are designed to prevent the movement or transport of surface soils by overland runoff of rain and melting snow. Many erosion control techniques exist, but only those temporary measures applicable to construction activities are considered here. Erosion control is being retained only in the context of preventing migration during implementation of the removal action. These techniques include silt fences and surface covers.

Surface covers place a barrier between the soil and the storm water runoff. Surface covers used for erosion control are identical to those used for dust suppression discussed above.

Silt fences allow water to flow through them while trapping particles suspended in the water. Examples of silt fence materials include woven plastic fabric or bales of hay set up to intercept flow from excavation areas.

4.1.3 Removal

4.1.3.1 Excavation

Excavation is a common method of removing impacted surface and subsurface soils from waste sites by scraping, cutting, digging, scooping, or vacuuming. Soils above the water table and within twenty meters of the surface are usually easy to excavate and remove. Deeper soils can be excavated with appropriate equipment or terraced excavations.

The main advantage of excavation is that the corrective action is very effective because impacted materials are physically removed from the site. Excavation is a standard construction practice and methods are available to handle most construction-related problems expected to occur in excavating and handling excavated materials.

The disadvantages of excavation are that the removal of impacted materials can require many safety precautions since it requires handling, transporting, and treating or disposing of contaminated materials. Control of fugitive dust would be necessary at SLAPS. Safety procedures and monitoring plans would be required to ensure the protection of the workers, the public, and the environment.

Excavation involves standard construction equipment that vary in size and function. The equipment and sequence of operations depend on physical characteristics of the excavated materials, dimensions of the excavation, size of a project, desired rate of excavation, precision of excavation, available work space, and haul distances. Typical types of excavation equipment include: backhoes, front-end loaders, scrapers, bulldozers, clamshells, draglines, and vacuum trucks.

Backhoes are used primarily when excavation is below grade and performed from a stable working surface such as a road or gravel pad. Backhoes allow good control of excavation dimensions and work well in hard and compacted soils. Dragline diggers are used for excavations

that are large in area and may be on a slope, in submerged areas, or on soils that will not support conventional excavation equipment. Placement of the dragline bucket is less precise than a backhoe and digging in hard soil is difficult. Clamshell diggers are used for deep excavations that could be submerged or in narrow areas. Front-end loaders are used to excavate materials at or above grade from a stable working surface. Various models exist with a range of bucket capacities. Scrapers are used to excavate, haul, dump, and spread large amounts of soil over short distances. Scrapers are typically used for site grading and balancing cut and fills. Bulldozers are used in combination with other equipment to excavate, spread, and move materials. Vacuum trucks are used for small surface cleanups of materials that can be extracted by suction.

Excavation technology using a variety of equipment is retained as a possible component of the action alternatives.

4.1.4 Treatment

Treatment includes a wide range of technologies, only a limited number of which are applicable to radioactive materials. Treatment categories that are applicable to radioactive waste are physical, chemical, and immobilization processes. Physical treatment processes include soil washing and soil sorting. Chemical treatment processes for radionuclides usually involve extraction of the contaminants and can be used in conjunction with physical processes such as soil washing. Immobilization processes are not typically used for treatment of low activity radioactive waste as they do not change the toxicity of the waste and in most instances substantially increase the volume of the waste. Therefore, immobilization processes were not considered for treatment of these soils.

Soil washing technologies involve physical separation of the soil particles based on particle size and/or density. Soil washing equipment typically includes several unit operations such as screens and sieves, hydroclassifiers, filter presses, etc. The wash water is typically recycled back to the system. Soil sorting systems use conveyor systems, radiation detectors, and computer controls to continuously separate radioactive soil from the nonradioactive soil. Soil exceeding cleanup criteria would be diverted to a separate pile from the clean soil. Grab samples taken from the conveyor belt would be analyzed to confirm the operation of the detectors.

The reliability of treatment technologies for soil depends heavily on the characteristics of the soil at the site and generally requires treatability tests to assess the effectiveness of the technology prior to implementation. Consequently, treatment is usually not as readily implementable as other technologies. Costs associated with treatment are generally higher than containment technologies, but are lower than the cost of removal and disposal because the disposal volume is significantly reduced by the treatment process.

As discussed in Section 2.4.2, some treatability testing has already been completed at SLAPS. Should an effective treatment be identified at a later date, USACE would consider implementation of such treatment on any remaining soils.

4.1.5 Interim Storage

Interim storage involves the temporary placement of radioactive materials in a manner that effectively protects human health and the environment. Interim storage can be achieved by placing the material in an existing engineered facility or in a newly constructed facility. Costs range from low, if an existing storage facility is available, to moderately high, if construction of a new facility is required.

Interim storage is eliminated from further consideration on the basis of cost, implementation time, and lack of significant benefit.

4.1.6 Transportation

Transportation refers to the movement of waste offsite to a disposal facility. Onsite waste movement is considered material handling rather than transportation as there is no use of public roads. The distinction is important because many of the requirements and restrictions imposed by the Department of Transportation apply only to waste moved offsite. Transportation will be retained as an element of alternatives utilizing offsite disposal. Transportation costs are low to moderate depending on the distance to the receiving facility.

Considerations in selection of the method of containerization and transportation include waste volume, regulatory requirements for packaging, labeling, and placarding, as well as availability of transportation vehicles. Limitations of the receiving facility, including unloading capabilities, must also be considered. Material characteristics and economics are the primary concerns in selecting the form of transportation. The three primary methods of waste transportation for containerized or bulk material are truck, barge, and railcar. Truck and rail transportation are retained as components in alternatives where material is shipped offsite.

4.1.7 Disposal

Disposal involves the permanent placement of radioactive materials in a manner that reduces mobility and protects human health and the environment for the long term. This technology can effectively reduce contaminant mobility and the potential for human exposure. Alternatives for ultimate disposal of wastes from the SLAPS include disposal in a licensed commercial low-level waste disposal facility, or disposal in a permitted engineered landfill facility (i.e., Subtitle C or D disposal facility), dependent on the waste acceptance criteria and the SLAPS soil characteristics.

4.1.7.1 Landfill

Landfills have historically been used for the disposal of all types of municipal and hazardous solid wastes. Current regulations and practices generally require separate facilities for hazardous waste and nonhazardous waste. Both RCRA Subtitle C and Subtitle D landfills are permitted to accept CERCLA hazardous substances that meet the waste acceptance criteria of the particular landfill. Some RCRA Subtitle C and Subtitle D landfills are permitted to accept certain

levels of radioactive waste materials. Those landfills that are permitted to accept certain levels of radioactive waste materials would be able to accept low-level radioactive waste generated as a CERCLA hazardous substance, as long as the waste meets the waste acceptance criteria of the landfill.

Landfills can be constructed above grade, below grade, or as a combined below and above grade landfill, depending on design requirements and site conditions. Landfilling usually involves depositing solid waste or soil in a natural or excavated depression and covering the waste with soil or clay using standard excavation equipment. Examples include municipal waste landfills or specially constructed disposal facilities.

Waste that is generated as a result of environmental restoration operations will require characterization to ensure the waste stream meets the waste acceptance criteria (WAC) set by the disposal facility, land disposal restrictions set forth in 40 CFR 268, and any restrictions set by governing regulatory agencies.

Landfills must meet current standards for design, operations, and closure. Subtitle C landfills which manage hazardous waste must have 1) a primary leachate collection system; 2) a primary liner, usually a synthetic liner; 3) a secondary leachate collection, leak-detection, system; 4) a composite bottom liner system, usually a synthetic liner and compacted clay; and 5) a multi-layered RCRA cap system, usually compacted clay, synthetic liner, drainage layer, and topsoil.

Subtitle D landfills which manage solid waste must have 1) a leachate collection system, 2) a composite bottom liner, and 3) a final cover comprising an erosion protection layer underlain by an infiltration reduction layer. Both Subtitle C and D landfills may be appropriate for disposal of wastes generated during the SLAPS removal action. Disposal costs range from low to high depending on the type of landfill. Disposal in a Subtitle C or D landfill will be retained as a potential component of the alternatives.

4.1.7.2 Low Level Waste Disposal

Low level waste (LLW) is defined as waste that contains radioactivity and is not classified as high level, spent nuclear fuel, transuranic, or byproduct material. The purpose of LLW disposal is to isolate LLW during the time it poses an undue risk to humans and the environment. Disposal technologies for LLW typically isolate the waste in two different ways. Concrete and/or layers of earth are used to shield the radioactive material, while the migration of waste constituents by the infiltration of water is minimized. LLW disposal facilities may be constructed below grade, above and below grade, or above grade depending on the site conditions. Additional safeguards against water infiltration are also determined by the site conditions (arid vs. humid). The most common method of disposal of LLW involves burial. LLW disposal facilities must typically meet stringent siting and design requirements due to the longevity of the radioactivity.

LLW burial grounds are a proven disposal method. LLW is packaged in containers approved for transportation and disposal, transported to the NRC-licensed LLW disposal site and placed at the site for permanent disposal. Standard excavation equipment such as graders,

bulldozers, and backhoes are used for construction, operation, and closure of the burial ground. The waste generator is typically required to characterize the waste to ensure the waste stream meets the WAC set by the disposal facility and any restrictions set by governing regulatory agencies.

Below grade LLW burial involves placing the waste into excavated trenches, filling the trenches to grade and placing a surface stabilization cap over the trenches. Above grade LLW burial is similar to below grade burial except that the waste is put into above ground concrete vaults. To provide additional long-term stability, an earthen cover can be placed over the vault. Without the earthen cover, above ground vaults are much more susceptible to degradation by wind, rain, and freeze-thaw cycles. Monitoring above grade LLW burial sites is much easier than monitoring below grade burial sites, but above grade sites require stronger institutional controls to prevent human intrusion. Disposal costs are generally high for LLW landfills. Disposal in a LLW landfill will be retained as a potential component of the alternatives. The identification and screening of the technologies that may apply to the proposed action and key considerations are summarized in Table 4-1.

4.2 IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES

4.2.1 Alternative 1 – No Action

This alternative consists of leaving SLAPS and the Ballfields in their current condition. The SLAPS is currently being monitored for both surface and air releases of radionuclides as well as intermittent monitoring of the groundwater. While no new measures would be taken to reduce exposure or prevent migration of contaminants from the property, SLAPS would continue to be monitored and maintained.

4.2.2 Alternative 2 – Excavation and Disposal of SLAPS and the Ballfields

The following activities are included in Alternative 2:

- Excavate contaminated materials from SLAPS and the ballfields excluding the ditch north of McDonnell Boulevard (which is addressed under a separate removal action).
- Removal of contaminated materials would be initiated at the eastern edge of the property (intersection of McDonnell Boulevard and Banshee Road) and proceed westward.
- Excavated areas would be backfilled with borrow material from approved borrow source(s).
- Control surface water runoff using redirection of the existing drainage ditches including temporary elimination of flow to the ditch north of McDonnell Boulevard. If necessary, engineering controls could be implemented (e.g.; ditch flow routed to a segmented sedimentation basin with a fowl cover).

Table 4-1. Summary of General Response Technology Screening

Technology	Evaluation Result	Comments
Institutional Controls		
Land use or deed restrictions	Retained	Limits on-site exposure to contaminants. but not effective in controlling the source or migration of contaminants: may be effective when used in conjunction with other technologies. Deed restrictions would be imposed upon release of the property if any radioactive material is left on-site following completion of the removal action.
Access Restrictions	Retained	Limits on-site exposure to contaminants, but not effective in controlling the source or migration of contaminants; may be effective when used in conjunction with other technologies. Access controls are currently in place at SLAPS and will be maintained as an element of the No Action alternative.
Monitoring	Retained	Provides data for assessing control measures; may be effective when used in conjunction with other technologies. An environmental monitoring program is in place at SLAPS and the Ballfields and will be maintained pending final release of the property. Comprehensive environmental and personnel monitoring would be implemented throughout the proposed removal action.
Containment		
Capping	Rejected	Can reducc contaminant mobility and prevent direct exposure to soil; toxicity and volume of the radioactive materials would not be reduced. Does not reduce impact to groundwater due to contact with source materials.
Subsurface Barriers	Retained	Potentially effective in controlling groundwater migration from the site. Process options include slurry walls, grout barriers, and sheet piling.
Dust Suppression	Retained	Potentially effective in reducing worker exposure to radiation via inhalation and preventing offsite migration by the air pathway.
Erosion Control	Retained	Potentially effective in preventing offsite migration through surface water runoff.
Removal		
Excavation	Retained	Easy to implement using conventional earth moving equipment. Requires storage or disposal facility for excavated waste.
Treatment		
Chemical/Physical Treatment	Retained	Treatment (field sorting based on in situ testing) is retained as the representative process option for detailed evaluation.
Interim Storage	Rejected	Relocation of material to a interim storage location would provide no significant benefit
Transportation		
Truck	Retained	Potentially applicable for alternatives that generate small volumes of waste material or for transportation over short distances.
Rail	Retained	Potentially applicable for alternatives that generate large volumes of waste or for transportation over long distances.
Barge	Rejected	Limits selection of disposal facility to location accessible by barge or requires use of multiple transportation modes.
Disposal		
On-site	Rejected	On-site disposal of materials above the cleanup criteria would not comply with Missouri landfill siting regulations.
Off-site	Retained	Off-site disposal at commercial facilities is retained for both Subtitle C and D landfills (hazardous waste and solid waste) for waste meeting the radiological restrictions of these landfills and low-level radioactive waste facilities for waste exceeding Subtitle C or D facility restrictions.

- Provide for on-site soil staging/rail capacity/soil conditioning including a pre-engineered building with capacity for soil conditioning and outside soil staging.

- Excavation below the water table could be required in some locations. Therefore, contaminated water would be treated on-site prior to discharge or sent to a POTW.

- Clean up would be completed to the criteria A, B, or C as shown in Table 4-2. Chemicals and metals would be remediated consistent with industrial clean up screening levels for potential contaminants of concern (PCOC) above environmental background levels. Contaminated materials would be disposed at an appropriately permitted or licensed disposal facility(s).

Table 4-2. Proposed Cleanup Criteria

Cleanup Criteria	Cleanup Criteria (pCi/g)					
	Radium-226		Thorium-230		Uranium-238	
	Surface (top 6")	Subsurface (Below 6")	Surface (top 6")	Subsurface (Below 6")	Surface (top 6")	Subsurface (Below 6")
A (Industrial)	5	50	5	100	50	150
B (Industrial)	5	15	5	40	50	150
C (Residential)	5	15	5	15	50	50

4.2.3 Alternative 3 – Excavation and Disposal of SLAPS and the Ballfields with Use of Below-Criteria Backfill

The following activities are included in Alternative 3:

- Excavate contaminated materials from SLAPS and the ballfields excluding the ditch north of McDonnell Boulevard

- Removal of contaminated materials would be initiated at the eastern edge of the property (intersection of McDonnell Boulevard and Banshee Road) and proceed westward.

- Control surface water runoff using redirection of the existing drainage ditches including temporary elimination of flow to the ditch north of McDonnell Boulevard. If necessary, engineering controls could be implemented (e.g.; ditch flow routed to a segmented sedimentation basin with a fowl cover).

- Provide for on-site soil staging/rail capacity/soil conditioning including a pre-engineered building with capacity for soil conditioning and outside soil staging.

- Excavation below the water table could be required in some locations. Therefore, contaminated water would be treated on-site prior to discharge or sent to a POTW.

- Clean up would be completed to the criteria A, B, or C as shown in Table 4-2. Chemicals and metals would be remediated consistent with industrial clean up screening levels for potential contaminants of concern (PCOC) above environmental background levels. Contaminated materials would be disposed at an appropriately permitted or licensed disposal facility(s).

- Excavated materials that are below the selected criteria (i.e., soils that are below the selected cleanup criteria and require excavation) and that meet guidelines for chemical and metal PCOCs would be used at the SLAPS as backfill. A statistically valid method to define the undisturbed volume of material that can be used as backfill would be developed (e.g.: using guidance in the Multi-Agency Radiation Site Survey Investigation Manual (MARSSIM) for in-situ screening combined with sampling of the materials to be hauled). Additional backfill materials will be obtained from an approved barrow source(s).

A summary of Alternatives 2 and 3 is shown in Figure 4-1.

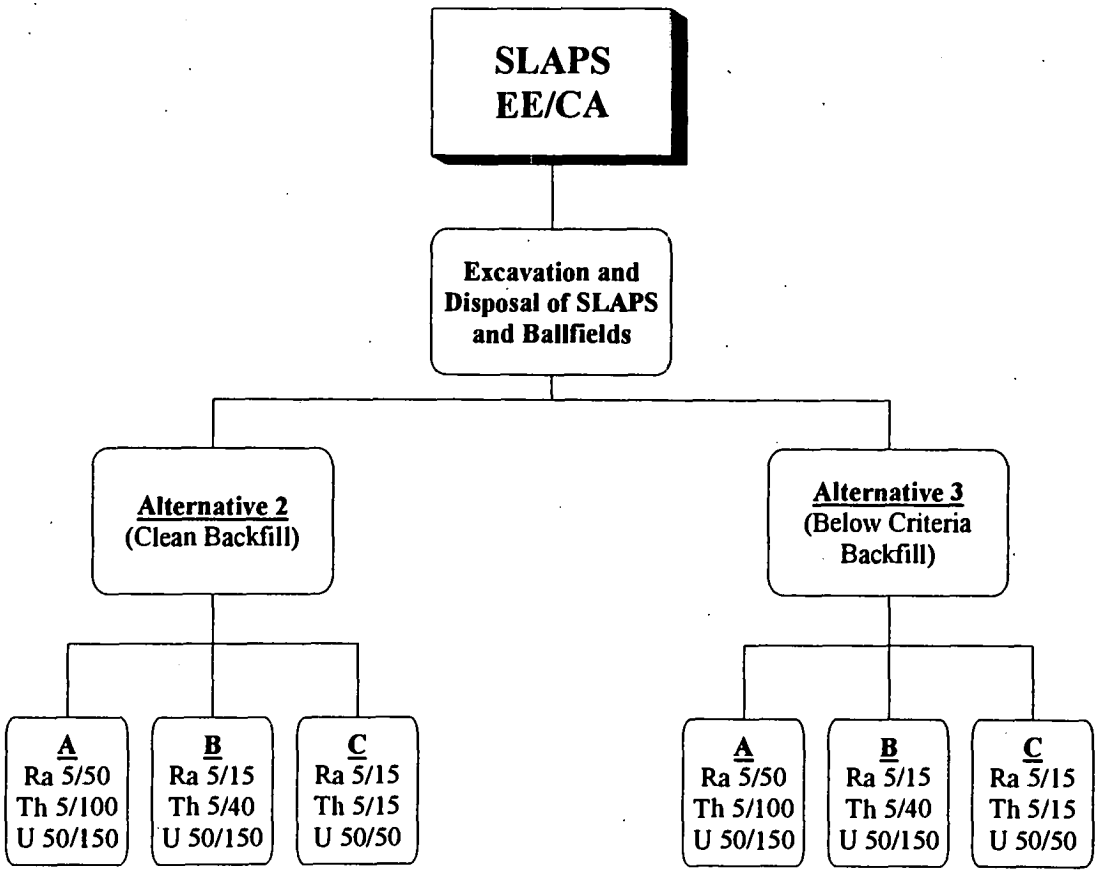

Figure 4-1. Summary of Alternatives

5. EVALUATION OF ALTERNATIVES

The proposed removal action is intended to reduce the risk to the public while the CERCLA process is completed. The action will ensure protection of human health and the environment under the evaluated land use assumptions. This section evaluates the alternatives identified in the previous section with respect to their effectiveness, implementability and cost in the context of a proposed industrial future use of the site.

5.1 EFFECTIVENESS

The effectiveness of an alternative is defined by its ability to protect human health and the environment from risks associated with the radioactive materials in both the short term and the long term. Measures of effectiveness include 1) reduction of potential risks to human health and the environment; 2) compliance with regulatory requirements; 3) timeliness; and 4) reduction of toxicity, mobility, and volume through treatment.

5.1.1 Potential Health Impacts

NRC limits doses to 25 mrem/yr with ALARA for unrestricted release. EPA also specifies a risk limit of 3×10^{-4} in their recently released guidance directive (USEPA OSWER No. 9200.4-18, August 22, 1997). These limits are considered protective and are consistent with standards set by the International Commission on Radiological Protection and the National Council on Radiological Protection and Measurements. Additional information regarding the dose estimates for each alternative and their respective exposure assumptions are presented in Appendix C.

5.1.1.1 Worker Radiation Dose and Health Risk During Remedial Action

Workers at CERCLA sites are required to meet certain Occupational, Safety, and Health Standards found in 29 CFR 1910. These standards specify requirements for exposure to noise, ionizing radiation, and hazardous materials and establish requirements for worker training and the development of emergency response/health and safety plans. In addition, the requirements of 29 CFR 1926 and 1904 that specify safety equipment and procedures during site remediation as well as recordkeeping and reporting requirements will be followed.

Potential worker exposures would increase in the short-term during the removal action for 2 and 3 with the greatest exposure for cleanup criteria C. The primary exposure pathways would include inhalation of contaminated dust and external gamma radiation. All activities associated with the implementation of the remedial action would be conducted according to the site-specific health and safety plan to protect workers and the public. The potential radiation doses to workers conducting the remedial action would be mitigated by strict compliance with environmental, safety and health protection guidelines and appropriate engineering practices for radiation protection.

The potential radiation dose to workers implementing the alternatives was estimated using the RESRAD computer code, version 5.621 (Yu et al. 1993). The upper 95% confidence levels on the means (UCL_{95}) of the data set, less background, were used as the reasonable maximum exposure concentrations (RME) for this evaluation. The data set was selected based on anticipated conditions during removal activities for each alternative.

Selection of Alternative 1 would result in no change in radioactive exposure to workers. Using the assumption of external gamma, dust inhalation, and incidental soil ingestion as pathways, the dose to a current employee is predicted to be approximately 290 mrem/yr at SLAPS and 8.2 mrem/yr at the Ballfields.

For Alternatives 2 and 3, the RMEs were calculated from the subsurface data for SLAPS and the Ballfields excluding the ditch north of McDonnell Boulevard. The duration of the excavation activity was estimated using *Mean's Heavy Construction Cost Data* (Means 1996). The highest dose to the worker during the removal action period should not exceed 820 mrem/yr at SLAPS and 20 mrem/yr Ballfields for Alternatives 2 and 3, cleanup criteria C. Therefore, exposures for all alternatives are well below the federal limit of 5,000 mrem/yr for radiological workers (10 CFR 20). Estimates tend to overestimate dose in that no credit is taken for wearing protective clothing, and it is assumed that the same crew will be involved in all tasks. Actual doses would likely be considerably smaller than those estimated here for the modeled worker.

Alternative 3 includes the placement of below criteria soils back into the excavation at SLAPS. Below criteria soils would consist of materials below the selected cleanup criteria that have to be removed to gain access to more contaminated soils. For below criteria materials that originate at SLAPS, these alternatives represent less material handling than off-site shipment. For materials that originate at the Ballfields, transportation to the SLAPS and placement in the excavation will be comparable to transportation to the loadout facility and placement into rail cars. Therefore, no additional dose to radiation workers is anticipated as a result of use of below criteria soils.

5.1.1.2 General Public Radiation Dose and Health Risk During Remedial Action

During construction, processing, and transportation activities associated with Alternatives 2 and 3, a resident or employee at a nearby property could receive a radiation dose above normal background exposure. The primary exposure pathway for the off-site public would be inhalation of dust. The dose to the off-site receptor from external gamma radiation would be negligible because the external gamma exposure rate decreases rapidly with distance from the source. The risk of spillage during transport is small and, because of the nature of the material (soil), any spillage could easily be retrieved for disposal. Thus, the potential for exposure to the public due to transportation of the waste would be minimal under Alternatives 2 and 3.

5.1.1.3 General Public Radiation Dose and Health Risk Following Remedial Action

As discussed in Section 2.5, the predicted dose to a maximally exposed future industrial worker is 290 mrem/yr in the absence of cleanup. This scenario assumes that the worker is exposed to the bare ground, exposing the higher-concentration subsurface soils.

Alternate scenarios for the expected future use of the site were also evaluated. The St. Louis airport restricts possible activities at the SLAPS and ballfields property and the surrounding area is commercially developed. Thus, following completion of the removal action, the maximally exposed individual is expected to be an industrial worker. This employee is expected to work at the facility for 8 hours per day (4 hours indoors and 4 outdoors), 5 days per week, 50 weeks per year. It is assumed the site is unpaved and residual contamination is exposed at the surface. Potential exposures were calculated using the RESRAD model (Yu, Zielen, et al. 1993). Details of the parameters used in all calculations are presented in Appendix C.

Results show that if an industrial worker is exposed to radionuclides at the ballfields under any of the alternatives considered, dose estimates are lower than the 100 mrem/yr limit recommended by the International Commission on Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurements (NCRP), and the Nuclear Regulatory Commissions (NRC) decommissioning limit of 25 mrem/yr. The estimated risks to the industrial worker are in the 1×10^{-4} to 8×10^{-5} range and are, therefore, within the CERCLA risk range of 10^{-4} to 10^{-6}.

Results for the industrial worker vary widely when considering exposures at SLAPS. Under Alternative 1, the industrial worker is estimated to receive a dose of 290 mrem/yr. Under Alternatives 2 and 3, doses range from 11 to 16 mrem/yr. Risks are within the acceptable range with a maximum of 1×10^{-4}, which is below the 3×10^{-4} limit recognized by the EPA as protective. All doses for Alternatives 2 and 3 are below ICRP, NCRP, and NRC criteria.

5.1.1.4 Potential Environmental Impacts

Soils and Water Resources

Under Alternative 1, no additional impacts to soil, surface water, or groundwater resources would occur as a result of taking no action. Alternatives 2 and 3 would have a beneficial effect on soil and water resources by removing the radioactive sources of contamination. However, regardless of the extent of the excavation, the impact to soil and water resources will vary with the cleanup criteria selected. A thorough evaluation of groundwater will be an integral part of the Record of Decision and the final remedy for the SLAPS and Ballfields.

Air Quality

Alternative 1 would result in no incremental impacts on air quality. Alternatives 2 and 3 could have short-term impacts. Resuspension and dispersion of particulates during construction,

processing and transportation activities under the other alternatives could impact local air quality during implementation. These impacts, however, would be mitigated during the removal action and eliminated after the remedial action was completed.

Impacts to air quality would be minimized by implementing good engineering practices such as wetting and covering exposed surfaces during the implementation period. Monitoring of ambient concentrations of airborne particulates and radon would be conducted throughout the removal action to ensure compliance with requirements to protect workers and the public.

Ecological Resources

Following consultation with the U.S. Fish and Wildlife Service, it was determined that two designated endangered or threatened species may occur near the proposed action area. None of the alternatives presented in this document are likely to impact the pallid sturgeon (Scaphirhynchus albus) because the water quality and quantity in Coldwater Creek are not adequate to support them. While bald eagles are known to stay through the winter in this area, it is unlikely that they use the airport area because of poor habitat quality. Therefore, no impact to ecological resources is anticipated as a result of implementation of Alternatives 2 or 3 or the range of cleanup criteria associated with each alternative.

Wetlands and Floodplains

Alternative 1, No Action, would not have any impact on the streams and associated wetlands. The potential for offsite migration into Coldwater Creek would continue to exist.

Alternatives 2 and 3 would greatly reduce the possibility of adverse impact to Coldwater Creek in the long term by removing source materials from the site. The removal of contaminated surface materials and materials from below the groundwater table would be a particularly effective method of reducing potential impacts to Coldwater Creek. Radioactive materials could potentially migrate to Coldwater Creek during implementation, but this possibility would be mitigated by use of dust suppression and erosion controls.

Cultural Resources

No archaeological or historical sites included in the National Register of Historic Places are located within 1.6 m (1 mi) radius of the airport area. However, numerous archaeological and historic sites are known to exist along Coldwater Creek downstream of the site. No downstream sites are known to be impacted by radioactivity from the SLAPS site. By removing source materials from the site, all the alternatives (except No Action) would reduce the potential for future impacts to the downstream sites.

5.1.2 Compliance with Regulatory Requirements

Alternative 1, No Action, would not comply with ARARs if selected as a final remedy because the site is not permitted in the current configuration as a final disposal site for the radioactive soil.

Alternatives 2 and 3 would comply with ARARs. However, the process of showing compliance and protectiveness would vary significantly for any of the alternatives presented depending on the cleanup criteria selected. No waste present in the soil exceeds limits that would render the waste a federal or state RCRA hazardous waste.

Regulations found in 49 CFR Parts 173-177 relating to the shipment of radioactive and hazardous materials must be complied with to ship material offsite. These requirements specify stringent requirements for packaging, labeling, marking, shipping, placarding, and reporting for transportation of hazardous materials. In addition, specific CERCLA reportable quantity (RQ) requirements are imposed for shipments of radioactive materials greater than 2000 pCi/g. The removed site material would be disposed as either solid or hazardous waste at a Class C or D landfill or as LLW at a LLW facility depending upon the levels of radioactivity and other contaminants present in the waste stream.

5.1.3 Timeliness

No time would be required to implement Alternative 1 as no new actions would be taken. Alternatives 2 and 3 would require 14 to 25 months depending on the cleanup criteria selected and the extent of removal action completed.

5.1.4 Reduction of Contaminant Toxicity, Mobility, and Volume Through Treatment

Section 121 of CERCLA specifies a statutory preference for remedial actions that use treatment technologies that permanently and significantly reduce the toxicity, mobility, or volume of the hazardous substances as a principal element. Because the primary contaminants of concern at SLAPS are radionuclides, treatment for reduction of toxicity is not feasible. Therefore, only treatment to reduce contaminant mobility and/or volume may be considered. Among the alternatives considered, Alternative 3 includes activities to reduce volume. In Alternative 3, the soil exceeding the radiological criteria would be distinguished in situ from the soil at or below the cleanup criteria. The soil that is below the selected criteria would be used on-site as backfill to replace soil excavated from the subsurface. The soil exceeding the cleanup criteria would be transported offsite to a commercial disposal facility for final disposition.

5.2 IMPLEMENTABILITY

Implementability refers to the technical and administrative feasibility of implementing an alternative, and the availability of the materials and services required during its implementation. Technical feasibility includes operational reliability or the ability of the technology to meet

specified performance goals or efficiencies, the relative ease of implementation, and the ability to monitor the effectiveness of the action. Administrative feasibility includes the ability to obtain any required approvals and permits from other agencies or government bodies. Availability of services and materials refers to the availability of treatment, storage and disposal services, including availability of waste disposal capacity, the availability of services and specialists to perform the work, the timing of the availability of prospective technologies, and the potential for obtaining competitive bids.

Technical and administrative feasibility and availability of goods and services is evaluated for each of the alternatives in the following sections.

5.2.1 Technical Feasibility

For Alternative 1, no action, no technical barriers exist to continuing the present program.

Alternative 2, excavation and disposal with clean backfill, is readily implementable from a technical perspective. Alternative 3, excavation and disposal with use of below criteria excavated soils would experience technical requirements similar to Alternative 2 during the excavation phase of implementation. The use of in situ testing to determine which soils are below the selected criteria *prior* to excavation would use proven testing procedures, but the need to segregate these soils during removal would complicate the excavation.

5.2.2 Administrative Feasibility

Alternative 1, no action, would not require permits or approvals from other agencies, and is thus administratively feasible. Depending on the cleanup criteria selected, Alternatives 2 and 3 could leave radioactive materials onsite above release criteria. This would result in deed restrictions or notices, thus Alternative 2 and 3 could be administratively more difficult. If the local officials and public do not agree to use of below-criteria soils as backfill, additional administrative barriers to Alternative 3 are foreseen.

5.2.3 Availability of Services and Materials

No problems are anticipated in obtaining services and materials for the no action alternative. Likewise, services and materials for Alternatives 2 and 3 are expected to be readily available. Both of these alternatives involve only standard construction technologies that are available from a large number of vendors. Adequate disposal capacity exists to accept the waste generated by either alternative, although multiple Subtitle C and D landfills could be required.

5.3 COST

Cost estimates were prepared for all three alternatives (see Appendix D). In accordance with CERCLA guidance, a 30-year time frame was used in the cost calculations for all alternatives. Alternative 1 is estimated to cost $11.4 million over the next 30 years to continue the present

program of access restrictions and monitoring. The cost of the excavation alternatives is presented in Table 5-1. These costs represent conceptual level estimates and do not incorporate the efficiencies associated with large scale excavation projects. While the cost savings associated with Alternative 3 are relatively small for this portion of the total St. Louis site, application of this approach to other portions of the project could result in $5 million to $20 million of cost savings. The costs presented below include disposal at a LLW disposal facility. Use of Subtitle C or D landfills for any or all of these soils could represent significant cost savings.

Table 5-1. Cost Summary

	Cost ($MM)		
	A **Ra-226 5/50 pCi/g** **Th-230 5/100 pCi/g** **U-238 50/150 pCi/g**	**B** **Ra-226 5/15 pCi/g** **Th-230 5/40 pCi/g** **U-238 50/150 pCi/g**	**C** **Ra-226 5/15 pCi/g** **Th-230 5/15 pCi/g** **U-238 50/50 pCi/g**
Alternative 2 *	$106	$150	$219
Alternative 3 *	$103	$145	$210

* - includes all of SLAPS within the fenceline, areas between the fenceline and the railroad, areas between the fenceline and McDonnell Boulevard, and the Ballfields excluding the ditch north of McDonnell Boulevard.

5.4 COMPARATIVE SUMMARY

Alternatives for the removal action at SLAPS are compared in Table 5-2.

Alternative 1, No Action, would simply continue the current program of site access restrictions and monitoring. Alternative 1 is technically implementable, but would be the least effective in the long term as continuous efforts would be required to ensure maintenance of the access controls (fences and warning signs). Ongoing monitoring would also continue to be necessary. Alternative 1 has the lowest cost of the alternatives.

Alternative 2, Excavation and Disposal with clean backfill, is also readily implementable. If the waste material is sent to a class C or D landfill, then the cost would be less than a radioactive disposal storage facility. The competitive procurement process would determine the commercial disposal facility to which the impacted soils would be sent.

Alternative 3, Excavation and Disposal with use of below criteria excavated materials, has some barriers to technical implementability as the need to segregate these soils during removal could complicate the excavation. If the waste material is sent to a class C or D landfill, then the cost would be less than a radioactive disposal storage facility. The cost is higher than for Alternative 1.

Table 5-2. Summary of Comparative Analysis

Criteria	Alternative 1 No Action	Alternatives 2 and 3 Excavation and Disposal of SLAPS and the Ballfields
Overall protectiveness of human health and the environment	No change in radioactive exposure. No additional impacts to soil, water resources, or air quality; no direct impacts to floodplains and wetlands, although existing potential for migration into Coldwater Creek would continue. No disturbance of cultural resources.	Reduction of potential direct contact with radioactive soils is achieved by removing soils above criteria. Possible generation of airborne particulates during construction would be minimized using dust suppression techniques. Potential for radioactive material migration to Coldwater Creek during construction would be minimized by preventive measures. Overall reduction of potential migration in the long term. No disturbance of cultural resources.
Compliance with ARARs	Does not comply.	Federal or state hazardous waste generator and disposal requirements do not apply. Offsite shipments subject to appropriate DOT packaging and shipping requirements for radioactive materials.
Long-term effectiveness and permanence	Not effective	Effective. Implementation would restore the site to beneficial use. Depending on cleanup criteria selected, a review would be conducted at 5-year intervals.
Short-term effectiveness and environmental impacts	No short-term improvements or impacts.	Increased short-term worker exposures during construction estimated maximally at 840 mrem. Potential offsite hazard due to above-backgrounddust inhalation during construction would be minimized using dust suppression techniques. External gamma exposure would be minimized. Minimal transportation risks of spillage or accident.
Timeframe	No time requirements for implementation.	Fourteen to 25 months assuming no annual funding constraints
Reduction of toxicity, mobility, or volume through treatment	No treatment provided.	Alternative 3 – Volume reduction by insitu identification of soils exceeding radiological criteria and transporting offsite for final disposition; below criteria soils used to backfill excavation.
Implementability	No technical barriers to implementation. Materials and services to continue current program are readily available.	No technical barriers to implementation. Materials and services readily available.
Cost	$11.4 million	$103 to 219 million (depending on the cleanup criteria selected) assuming the contaminated materials are disposal as LLW. Use of below criteria soils (i.e., soils that are below the selected cleanup criteria and require excavation) would result in a cost savings of approximately $8 million. Furthermore, expanded use of below criteria soils from other portions of the St. Louis Site could provide significant additional savings.

6. PUBLIC PARTICIPATION

Public input was encouraged by USACE to ensure that the remedy selected for the St. Louis Airport site meets the needs of the local community in addition to being an effective solution to the problem. The administrative record file contains all the documentation used to support the selected alternative and is available at the following locations:

Public Information Center
9170 Latty Avenue
Hazelwood, Missouri 63042

St. Louis Public Library / Main Library
Government Information Section
1301 Olive Street
St. Louis, Missouri 63103

St. Louis County Library
Prairie Commons Branch
915 Utz Lane
Hazelwood, Missouri 63042

The public was encouraged to review and comment on all alternatives described in the EE/CA during the public comment period which was held between March 6, 1998 and April 9, 1998.

Comments on the proposed removal action at the St. Louis Airport site were accepted for 34 days following issuance of the draft EE/CA. A public meeting was held during the comment period to receive any verbal comments the public wished to make.

USACE responded to all significant comments submitted during the comment period. After considering these comments, USACE decided to implement Alternative 2C utilizing the 5/15 Ra, 5/15 Th, 50/50 U (pCi/g) cleanup criteria. Responses to public comments are documented in a responsiveness summary that is an attachment to this EE/CA.

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7. IDENTIFICATION OF THE PREFERRED ALTERNATIVE

Based on the evaluation of alternatives and overwhelming public support received during the public comment period, USACE proposes Alternative 2C, Excavation and Disposal of SLAPS and the Ballfields, as the preferred alternative. Under Alternative 2C, soils from SLAPS and the Ballfields (excluding the north ditch) that exceed the selected criteria of 15/15/50 pCi/g (respectively for Ra-226/Th-230/U-238) above background (by SOR) would be excavated and disposed of at a licensed or permitted disposal facility. Soils within the top 6-inch layer that exceed the 5/5/50 pCi/g above background (by SOR) will be excavated. Should an effective treatment be identified at a later date, USACE would consider implementation of such treatment on any remaining soils. Residual risk after implementation of the proposed alternative will fall within the EPA risk range for workers and the general public and can be implemented in a timely and cost effective. This alternative is consistent with the anticipated final remedy for the site.

Detailed engineering plans and work instructions will be prepared prior to initiation of removal activities, providing detailed specifications for all applicable procedures. Associated planning activities will include preparation of a health and safety plan detailing measures to ensure worker protection, and preparation of an environmental compliance plan specifying measures for compliance with environmental requirements (e.g., monitoring requirements, mitigative measures).

Materials requiring long-distance offsite shipment would be loaded onto railroad cars for shipment to an appropriate waste disposal facility. Wastes would be packaged and shipped in accordance with the receiving facility's waste acceptance criteria. Applicable transportation requirements of the U.S. Department of Transportation and the state of Missouri would be adhered to as well.

Appropriate precautions will be used to prevent the spread of radioactive materials during waste handling and transportation. Dust suppression techniques such as keeping soils moist during excavation and handling will be employed. Erosion controls such as silt fences will be erected prior to the onset of dirt-moving activities. The exteriors of all vehicles will be surveyed for radioactivity before being allowed to leave the site. Any vehicle found to exceed applicable guidelines would be decontaminated before being released from the site. Transportation routes would be established, and an emergency response plan developed and coordinated with appropriate local authorities.

Physical and administrative controls (contamination control zones, protective coverings, restrictions on materials and personnel entering controlled areas) will be used to prevent migration of radioactive materials to nonimpacted areas. Materials and equipment that exceed surface criteria as a result of their contact with radioactive materials will be decontaminated if practical.

All activities will be conducted in accordance with the site-specific health and safety plan and detailed work instructions will be prepared before initiation of the work. Appropriate precautions will be taken to reduce potential adverse impacts on the environment and minimize health risks throughout the removal action as summarized in Table 7-1.

Table 7-1. Mitigation Measures for the Proposed Action

Mitigative Measure	Description
Dust Control	Dust suppressants will be used during all activities having the potential for generating significant quantities of airborne particulate.
Worker Protection	An operational environmental safety and health plan will be developed for the proposed action. Respiratory protective equipment and other appropriate personnel protective equipment will be used as necessary. All workers will wear protective clothing and will have a radioactivity scan prior to leaving the work area. A comprehensive radiation monitoring and personnel dosimetry program will be implemented.
Environmental Surveillance	Gamma radiation levels and airborne particulate and radon concentrations will be monitored in the work area and site periphery to protect workers and the general public. Appropriate responses, such as increasing engineering controls, will be taken if measured radiation levels approach project administrative control limits.
Equipment Inspection	Equipment used for excavation, processing, and transportation of radioactive materials will be routinely inspected during operations. Equipment will be decontaminated as necessary to prevent migration of radioactive materials into uncontrolled areas.
Run-on Run-off Controls	Temporary berms or other diversion structures will control surface water run-on. Migration of radionuclides through run-off will be mitigated by sediment traps or silt fences.
Access Restrictions	Access to work areas will be restricted, and current access controls will be maintained during the removal action.
Traffic Controls	Transportation routes will be established for truck traffic from the property. Flagmen will be stationed at appropriate locations to assure that trucks enter and leave the site safely.

In summary, the proposed removal action will include the following activities:

- Preparation of a detailed work plan and health and safety plan;
- Site preparation;
- Implementation of environmental monitoring throughout the removal action to ensure compliance with all pertinent requirements;
- Excavation of the subsurface soil, backfilling below criteria soils, and transport of the contaminated materials to an offsite disposal facility;
- Rail transport of radioactive material to a disposal facility; and
- Verification of cleanup goals.

8. REFERENCES

ANL (Argonne National Laboratory) 1993. *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil.* ANL/EAIS-8, Environmental Assessment and Information Sciences Division, Argonne, Illinois, April.

Bailey, R. G. 1980. *Description of the Ecoregions of the United States.* U.S. Department of Agriculture, Forest Service Miscellaneous Publication No. 1391.

BNI (Bechtel National, Incorporated) 1983. *Radiological Survey of the Ditches at the St. Louis Airport Storage Site (SLAPS)*, Oak Ridge, Tennessee, August.

BNI 1987. *Radiological and Limited Chemical Characterization Report for the St. Louis Airport Site,* DOE/OR/20722-163, Oak Ridge, Tennessee, August.

BNI 1989. *Preliminary Geological, Hydrogeological and Chemical Characterization Report for the Ballfield Area.* DOE/OR/20722-211, Oak Ridge, Tennessee, February.

BNI 1993. *Baseline Risk Assessment for Exposure to Contaminants at the St. Louis Site.* DOE/OR/23701-41.1, Oak Ridge, Tennessee, May.

BNI 1994a. *Remedial Investigation Report for the St. Louis Site.* DOE/OR/21949-280, Oak Ridge, Tennessee, January.

BNI 1994b. *Site Suitability Study for the St. Louis Airport Site.* Job No. 14501, Oak Ridge, Tennessee, February.

BOM 1995. *Characterization of Soil Samples from the St. Louis, Missouri, FUSRAP Site*, US Bureau of Mines, Albany Research Center, August 10, 1995.

Braunstein, N. M., ed. (1981). *Health and Control Aspects of Coal Conversion,* Ann Arbor Science, Ann Arbor, Michigan.

DOE (U.S. Department of Energy) 1990. *Federal Facility Agreement in the Matter of: The United States Department of Energy, St. Louis and Hazelwood, Missouri*, Docket No. VII-90-F-0005, June.

EPA 1989. *National Priorities List, St. Louis Airport/Hazelwood Interim Storage/Future Coatings Co., St. Louis County, Missouri*, NIL-U8-2-6-10/89, October.

FEMA 1983. Flood Insurance Rate Map, City of Hazelwood, MO, St. Louis County. Community Panel No. 290357-0005-C, January 18.

Harl, J. 1992. University of Missouri Archeological Survey, personal communication with M. Grill, SAIC, April 22.

Hauth, L. D., and D.W. Spencer 1971. *Floods in Coldwater Creek, Watkins Creek, and River des Peres Basins, St. Louis County, MO*, prepared in cooperation with Metropolitan St. Louis Sewer District, U.S. Geological Service, Open File Report.

Nash, T. 1982. *Aquatic Biological Inventory, Coldwater Creek, St. Louis, Missouri.* U.S. Fish and Wildlife Service.

NOAA 1990. *Storm Data*, National Climatic Data Center, Asheville, NC, Vol. 90 1-13.

Orzell, S. 1979. *Vegetation and Wildlife Habitat Report*, V II-B, in J. Lark and Associates Linear Parks Project, St. Louis Department of Parks and Recreation, Clayton, Missouri.

Parker, M. A. and R. Szlemp 1987. *Final Fish and Wildlife Coordination Act Report, Coldwater Creek Flood Control Project, St. Louis, MO*, U.S. Fish and Wildlife Service.

RUST-CTC 1995. *DOE FUSRAP St. Louis Site, Treatability Study, Interim Characterization Report,* Rust Federal Services – Clemson Technical Center, Anderson, SC, January 16, 1995.

RUST-CTC 1996. *DOE FUSRAP St. Louis Site, Treatability Study, Conceptual Process Design Report,* Rust Federal Services – Clemson Technical Center, Anderson, SC, January 16, 1995.

SAIC 1992. *Initial Screening of Alternatives Report for the St. Louis Site,* St. Louis, Missouri, DOE/OR/21950-777, October.

St. Louis County, Department of Planning 1986. *The Challenges of Transition*, General Plan Update 1985 - St. Louis County.

St. Louis Task Force 1996. *St. Louis Site Remediation Task Force Report,* September.

Tidball, R.R. (1984). *Geophysical Survey of Missouri*, U.S. Geological Survey professional Paper 954-H.

Weston Environmental Consultants 1979. *Environmental Impact Assessment of the Former Airport Storage Site of the Atomic Energy Commission*, Oak Ridge National Laboratory Nuclear Division, Union Carbide, Oak Ridge, Tennessee, July.

USACE (United States Army Corps of Engineers) 1987. *Coldwater Creek Missouri Feasibility Report and Environmental Impact Statement*, St. Louis District, Lower Mississippi Valley Division, May.

Yu, C. et al. 1993. *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil.* ANL/EAIS-8, Argonne National Laboratory, Argonne, Illinois, April.

APPENDIX A

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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Table A-1. ARARS for the SLAPS

Standard, Requirement, Criteria or Limitation	Citation	Description of Requirement	ARAR Status	Comment
NRC Radiological Criteria for License Termination	10 CFR Part 20 Subpart E	This rule provides consistent standards to NRC licensees for determining the extent to which lands must be remediated before decommissioning of a site can be considered complete and the license terminated. These standards are: Unrestricted use: 25 mrem/y TEDE and ALARA; Restricted use: 25 mrem/y TEDE, ALARA, durable institutional controls, license termination plan (LTP), public input, and 100 mrem/y or 500 mrem/y if institutional controls fail; and alternate criteria: 100 mrem/y, ALARA, LTP, and EPA and public input.	Relevant and Appropriate	In this final rule NRC retained the 100 mrem/y maximum public dose limit and set a single dose limit of 25 mrem/y as protective of public health. USEPA would rather see a single dose limit of 15 mrem/y as protective of public health. Nonetheless, use of the 25 mrem TEDE dose level as an initial target concentration level will result in a cleanup of radioactive materials to a risk level of 3×10^{-4} or lower, which meets the risk level established by USEPA in OSWER Directive No. 9200.4-18, August 22, 1997.
Cleanup Levels for CERCLA Sites with Radioactive Contamination	USEPA OSWER No. 9200.4-18, August 22, 1997	In this Guidance, USEPA clarifies that cleanups of radionuclides must achieve risk levels in the 10^{-4} to 10^{-6} range, and that 3×10^{-4} is the upper boundary of that range, while 5×10^{-4} is too high of a risk level. USEPA asserts that cleanup to a level that will ensure 15 mrem/y TEDE will meet the upper boundary of the risk range.	TBC	In this Guidance USEPA sets forth the determination that dose limits established in the NRC rule generally will not provide a protective basis for establishing preliminary remediation goals under CERCLA.
Uranium Mill Tailings Radiation Control Act (UMTRCA) (October 1992): Cleanup of Radioactively Contaminated Land and Contaminated Buildings	40 CFR Sections 192.12(a), 192.32(b)(2), and 192.41	Residual radioactive material concentration of Ra-226 in land averaged over any 100 m^2 area shall not exceed the background level by >5 pCi/g averaged over the first 15 cm of soil (6 inches) and 15 pCi/g averaged over 15 cm thick layers of soil >15 cm below the surface.	Relevant and Appropriate	These requirements are relevant and appropriate based on the NCP evaluation factors of purpose (control of residual radioactive material), medium (contaminated soil), substance (uranium and thorium by-product materials), action/activity (cleanup standards and provisions), variances/waivers/ exemptions (supplemental standards for difficult-to-access contaminated soils), and type of place (land and buildings contaminated with residual radioactive materials from inactive uranium processing).

Table A-1. ARARS for the SLAPS (continued)

Standard, Requirement, Criteria or Limitation	Citation	Description of Requirement	ARAR Status	Comment
UMTRCA: Supplemental Standards	40 CFR 192.20 - 192.22	Defines supplemental standards for application contaminated soils left in place under the remedial action alternative because these soils pose no significant current risk and future exposures would be controlled by institutional controls. Remedial action will generally not be necessary where residual radioactive materials have been placed semi-permanently in a location where site-specific factors limit their hazard and from which they are costly or difficult to remove, or where only minor quantities of residual radioactive materials are involved.	Relevant and Appropriate	May be relevant and appropriate for soils left in place.
Clean Water Act - Effluent Limitations for Discharge of Radioactive Pollutants to Surface Waters	40 CFR 440.32(b) and 40 CFR 440.34(a)	Provides that discharge of pollutants from mines as liquid effluent must meet the following limits: <10 pCi/L of dissolved Ra-226 in any one day or <3 pCi/L of dissolved Ra-226 averaged over 30 consecutive days; <30 pCi/L of total Ra-226 in any one day or 10 pCi/L of total Ra-226 averaged over 30 consecutive days; and 4 mg/L of uranium in any one day or 2 mg/L of uranium averaged over 30 consecutive days.	Relevant and Appropriate	These limits reflect best practicable control technology (BPT) controls for pollutants in mine drainage from uranium, radium and vanadium ore mines. They can be used as guidelines for amounts of radioactivity allowed to be discharged into surface water or groundwater.
Primary Drinking Water Standards - MCLs for Radionuclides	10 CSR 60-4.060 (Missouri)	This rule provides that the MCL for radium-226 and radium-228 shall be: -combining Ra-226 and Ra-228, 5 pCi/l; -gross alpha particle activity including Ra-226 but excluding radon and uranium = 15 pCi/l.	Relevant and Appropriate	Any discharge into the Mississippi River cannot cause the level of radionuclides in the River to exceed these limits.

Table A-2. Location ARARS for the SLAPS

Standard, Requirement, Criteria or Limitation	Citation	Description of Requirement	ARAR Status	Comment
Archeological and Historical Preservation Act	16 USC § 469 40 CFR § 6.301(c)	Establishes procedures to provide for preservation of historical and archeological data which might be destroyed through alteration of terrain as a result of a Federal construction project or a Federally licensed activity or program.	*Applicable	*Would be applicable to excavation/decontamination/ dismantlement activities if historical or archeological resources discovered during remediation.
Archeological Resources Protection Act	16 USC § 470(a)	A permit should be obtained from the Federal land manager for excavation or removal of any archeological resources on Federal lands.	*Relevant and Appropriate	*Would be applicable to excavation/decontamination/ dismantlement work if archeological resources discovered during remediation. Project is not on Federal Lands; therefore requirement is not applicable.
Native American Graves Protection and Repatriation Act	25 USC §§ 3001-3013	Requires protection and repatriation of Native American cultural items found on or taken from Federal or tribal lands and requires repatriation of cultural items controlled by Federal agencies or museums receiving Federal funds.	*Applicable	*Would be applicable to excavation activities if cultural items are discovered.
Floodplain Management and Protection	Executive Order N. 11988	Requires Federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the maximum extent possible, the adverse impacts associated with direct and indirect development of a floodplain.	To Be Considered	Applicable to the extent that any development in a floodplain occurs.
Floodplain Management and Protection	40 CFR 6.302(a) and (b), Appendix A	Procedures on floodplain management and protection.	Applicable	Applicable to the extent that any excavation activities occur in the floodplain.

Table A-2. Location ARARS for the SLAPS (continued)

Standard, Requirement, Criteria or Limitation	Citation	Description of Requirement	ARAR Status	Comment
Dredge or Fill Requirements (Section 404)	40 CFR Parts 230 and 231 33 CFR 320-330	Requires permits for discharge of dredged or fill material into waters of the United States, which may include floodplains. General regulatory policies on permitting.	Applicable	Substantive requirements apply to on-site action if the Army Corps of Engineers determines that the floodplain is a "waters of the United States." It makes this determination in accordance with rules at 33 CFR Part 328.
USACE Implementation of Executive Order 11988 on Flood Plain Management	USACE Engineer Regulation (ER) 1165-2-26, March 30, 1984	This USACE ER contains decision making procedures that need to be incorporated in the planning, design and construction of civil works projects and in activities under the operation and maintenance programs.	To Be Considered	This ER is not a promulgated regulation and is therefore not an ARAR. The USACE must comply with it in planning, design and construction of Civil Works projects, in activities under the operation and maintenance program and in the real estate program. It would be relevant and appropriate guidance for FUSRAP sites if it were a promulgated requirement.
Governor's Executive Order, Floodplains	Executive Order No. 82-19	Potential effects of actions taken in a floodplain should be evaluated to avoid adverse impacts.	To Be Considered	Applicable to the extent that any excavation activities occur in the floodplain or jurisdictional wetlands.
Protection of Wetlands	Executive Order No. 11990, May 24, 1977	Under this EO, each agency must take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in conducting Federal activities. Wetlands values to consider when undertaking Federal activities are water supply, quality, recharge and discharge; pollution; flood and storm hazards; and sediment and erosion; maintenance of natural systems; and other uses of wetlands in the public interest.	To Be Considered	This rule is not a promulgated requirement and is therefore not an ARAR. However, Federal agencies must comply with its terms. Remedial activities at SLAPS could cause sediment loading at wetlands between SLAPS and the HISS/Futura properties. This effect should be mitigated in accordance with the EO provisions.

Table A-3. Action ARARs for SLAPS

Standard, Requirement, Criteria or Limitation	Citation	Description of Requirement	ARAR Status	Comment
Federal Environmental Requirements				
Clean Air Act - National Emission Standards for Radionuclide Emissions From Facilities Licensed by the Nuclear Regulatory Commission and Federal Facilities Not Covered by Subpart H	40 CFR Part 61 Subpart I	Emissions of radionuclides from any facility to the air shall not exceed levels that would result in an effective dose equivalent of 10 mrem/year	Relevant and Appropriate	Applicable to airborne emissions from regulated Federal Facilities. The St. Louis site is not a Federal Facility; therefore these standards are relevant and appropriate to emissions during the remedial action.
Clean Air Act - National Emission Standards for Radon Emissions from Department of Energy Facilities	40 CFR Part 61 Subpart Q	No source at a DOE facility shall emit more than 20 pCi/m^2-s of radon-222 as an average for the entire source, into the air. Facilities are exempted from source reporting requirements under 40 CFR 61.10.	Relevant and Appropriate	Radon emissions are controlled under three subparts of 40 CFR Part 61: Subparts Q, R, and T. All three were reviewed. Subpart Q is the most similar situation to that found at St. Louis, and is therefore the proper relevant and appropriate requirement.
"Guidelines for Groundwater Classification under the EPA Groundwater Protection Strategy"	USEPA, Office of Groundwater Protection, December 1986	This document sets forth three Classes of Groundwater: Class I – Special Ground Waters; Class II - Current and Potential Sources of Drinking Water and Water Having Other Beneficial Uses; and Class III - Groundwater Not a Potential Source of Drinking Water and of Limited Beneficial Use.	To Be Considered	Guidance in this document is useful in classifying groundwater underlying SLAPS. Class III groundwater includes waters that are so saline or contaminated that they cannot be used for drinking water or other beneficial uses. Waters in this category are those with a total dissolved solids level over 10,000 mg/L or those that are so contaminated that they cannot be cleaned up using methods reasonably employed in public water system treatment. Also, Class III groundwater must not be connected to Class I or Class II groundwater or surface water in a way that would allow contaminants to migrate.
Clean Water Act - National Pollutant Discharge Elimination System (NPDES)	40 CFR Parts 122-125	Provides that a permit need be obtained to discharge pollutants from point sources into waters of the state. A point source is any discernible conveyance from which pollutants are or may be discharged.	Applicable	Under CERCLA, permit requirements are waived for onsite actions. A discharge is "onsite" if the receiving water body is in the area of contamination or is in very close proximity to the site and necessary for implementation of the response action, even if the water body flows offsite. Substantive requirements must still be met.

Table A-3. Action ARARs for SLAPS (continued)

Standard, Requirement, Criteria or Limitation	Citation	Description of Requirement	ARAR Status	Comment
Environmental Protection and Enhancement	Army Regulation 200-1, effective March 21, 1997	Responsibility and policy for environmental protection are set forth in this document. Chapter 11 of the document provides guidance for 'Environmental Restoration Programs,' but programs under the jurisdiction of the Civil Works program are not subject to Chapter 11. Chapter 4 provides guidance on 'Hazardous Materials Management.' Radioactive substances are included as a hazardous material, but are not mentioned separately in Chapter 4.	To Be Considered: USACE must comply with requirements.	Technical and procedural information for each program area will be incorporated into the corresponding Department of Army Pamphlet (DA Pam) 200-1, which is yet to be published.
RCRA Generator Requirements	40 CFR 262	A person must test waste to determine whether the waste is hazardous. If hazardous, certain requirements must be observed.	Applicable	Applicable in that waste must be characterized before sending it offsite for disposal.
RCRA Hazardous Waste Characterization	40 CFR 260 and 261	These rules prescribe how to determine whether a waste is a solid or hazardous waste subject to regulation.	Applicable	Applicable in that waste must be characterized before sending it offsite for disposal.
RCRA Land Disposal Restrictions	40 CFR 268.7 and 268.32	Provides that a generator must determine whether his waste is one that is restricted from land disposal, and whether the waste meets the treatment standard. The generator then must notify the storage or disposal facility. Restricted wastes are prohibited from land disposal unless treated to specified standards.	Applicable	Applicable if RCRA hazardous waste is determined to be present.
State Environmental Requirements				
Restriction of Emission of Visible Air Contaminants	10 CSR 10-5.090	This rule provides that existing installations which emit less than 25 pounds per hour of particulate shall not discharge any air contaminant of a shade or density equal to or darker than that designated as No. 2 on the Ringelmann Chart or forty percent (40%) opacity.	Applicable	It is possible that the source of particulate emissions at SLAPS may be considered a New Source. In that case, 10 CSR 10-6.070 provides that the stricter of either the Federal NSPS emissions limit or any other limit applies.
Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin	10 CSR 10-6.170	This rule provides that no person may cause or allow any fugitive emissions to remain visible in the ambient air beyond the property line, and requires that measures be taken to ensure compliance.	Applicable	

Table A-3. Action ARARs for SLAPS (continued)

Standard, Requirement, Criteria or Limitation	Citation	Description of Requirement	ARAR Status	Comment
Water Quallty Standards for Metals in Coldwater Creek	10 CSR 20-7.031(3) and (4)	These provisions specify the general water quality criteria for Class C waters and specific criteria for acute and chronic toxicity requirements. Water contaminants must not cause or contribute to exceedences of values in Tables A and B of the Rule.	Applicable	This rule would apply to any underlying chemical contaminant present may not cause an exceedence of a State water quality standard. For toxic substances, metals need to be analyzed by the method for dissolved metals, or for mercury, total recoverable metals.
Water Quality Standards for Radionuclides	10 CSR 20-7.031(4)(I)	This rule provides that all streams shall conform with state and federal limits for radionuclides established for drinking water supply.	Applicable	Any discharge into the Mississippi River cannot cause the level of radionuclides in the River to exceed limits established for drinking water supply.
Storm Water Regulations: Surface Runoff and Erosion Control	10 CSR 20-6.200	This rule sets forth requirements for obtaining a permit for stormwater discharge, which includes surface runoff and erosion control.	Applicable	Permits are waived for on-site activities under CERCLA, but the substantive requirements of the rule still apply.
State NPDES Permit Program	10 CSR 20-6.010	This rule sets forth terms and conditions for the State NPDES permit program.	Relevant and Appropriate	Even if an NPDES permit is not required, substantive requirements for the permit must be met for a point source discharge. The State of Missouri administers the NPDES permit program.
Water Quality Certification	10 CSR 20-6.060	This rule specifies how to obtain State certification for a Section 404 action.	Relevant and Appropriate	With an onsite action, no permit is required, so State certification is not legally required. However, the consultation requirements of the rule must be met. The purpose of these is to ensure that the discharge of fill material does not violate Clean Water Act Section 401(a)(1) and complies with Clean Water Act Section 404(b)(1) guidelines.
Methods for Identifying Hazardous Waste	10 CSR 25-4.261	This rule sets forth characteristics and lists by which a generator can determine whether his waste is hazardous.	Applicable	Most of the Federal requirements are incorporated by reference.
Standards Applicable to Generators of Hazardous Waste	10 CSR 25-5.262	This rule sets forth standards for generators of hazardous waste.	Applicable	Applicable if hazardous waste is present. Most of the Federal requirements are incorporated by reference.
Land Disposal Restrictions	10 CSR 25-7.268	This rule establishes standards and requirements that identify hazardous wastes that are restricted from land disposal.	Applicable	Applicable if hazardous waste is present. The two Federal requirements included previously in this Table are incorporated by reference.

Table A-3. Action ARARs for SLAPS (continued)

Standard, Requirement, Criteria or Limitation	Citation	Description of Requirement	ARAR Status	Comment
[1]State Non-Environmental Regulations				
Maximum Permissible Exposure Limits for Radiation	19 CSR 20-10.040	This rule provides that the maximum permissible dose from all external sources of ionizing radiation for persons within a controlled area is: 5 rems/y or 3 rems/calendar quarter for the whole body, head and trunk, bone marrow, gonads or lens of the eye; 30 rems/y or 10 rems/calendar quarter for hands and forearms, feet and ankles. For persons outside a controlled area, the maximum permissible dose to the whole body is 2 mrem in any one hour, 0.1 rem in any 7 consecutive days and 0.5 rem in any year. Additional concentration limits are specified to limit the rate of radiation dose to the body.	[1]	Radon is not mentioned by name in this rule nor in the definitions section.

APPENDIX B

CORRESPONDENCE

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102559

American Indian Center of Mid-America

4115 Connecticut, St. Louis, Missouri 63116
1-314-773-3316

April 2, 1993

David Adler
Department of Energy
Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831-8723

Mr. Adler:

This message comes to express our concerns on the FUSRAP clean up of the two sites in St. Louis.

Historical St. Louis is known to hold sacred remains of our ancestors. We, the ancient population of the Native peoples who reside here, are today represented by approximately 6,000 Native Americans. In that number 41 different tribes are represented.

Being aware that the procedure for the clean up of these two sites in the St. Louis area is being drafted, the St. Louis Native American Community offers our assistance. The preservation of our culture is based on our historical, traditional, religion. The graves of our ancestors which are skeltal remains as well as certain funeral items are our link in a very sacred way.

We look forward to working with you.

Sincerely,

Evelyne R. Voelker

Evelyne R. Voelker
Executive Director
American Indian Center

ERV/tk

cc Dr. Richard Ambrose

101417

United States Department of the Interior

TAKE PRIDE IN AMERICA

FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Columbia Field Office
608 East Cherry Street
Columbia, Missouri 65201

IN REPLY REFER TO:

FWS/AES-CMFO

1993 MAR -8 PM 1:40

MAR 5 1993

Mr. Dave G. Adler
Department of Energy
Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831-8723

Dear Mr. Adler:

This responds to your December 10, 1993, letter requesting information regarding the baseline environmental conditions in the vicinity of the St. Louis Site, for the management and clean-up of radioactive contamination, in St. Louis, St. Louis County, Missouri. We regret not replying sooner, as we have been short staffed.

We have enclosed copies of the National Wetlands Inventory Maps for all three sites based on our understanding of specific locations taken from directions you outlined in your letter. We found some forested wetlands which lie within or adjacent to the properties and have highlighted them for your review.

No federally-listed endangered or threatened species occur in the proposed project areas. However, please contact the Missouri Department of Conservation (P.O. Box 180, Jefferson City, Missouri 65101) concerning state-listed rare and endangered species.

We regret that, without a site visit and a tremendous amount of field evaluation, it is impossible to assist in a detailed description of the local aquatic and terrestrial flora and fauna, existing ecosystems, and the range and habitats of the ecosystem inhabitants. We suggest a thorough review of the properties by your team followed by discussions with local Missouri Department of Conservation personnel.

We appreciate the opportunity to review this project. Should you have questions concerning these comments, or if we can be of further assistance, please contact Ms. Kelly Srigley Werner at the above address, or by telephone at (314)876-1911.

Sincerely,

Jerry J. Brabander
Field Supervisor

Enclosure

cc: MDC; Jefferson City, MO (Attn: Dan Dickneite)
MDC; Jefferson City, MO (Attn: Dennis Figg)
EPA; Kansas City, KS (Attn: Kathy Mulder)

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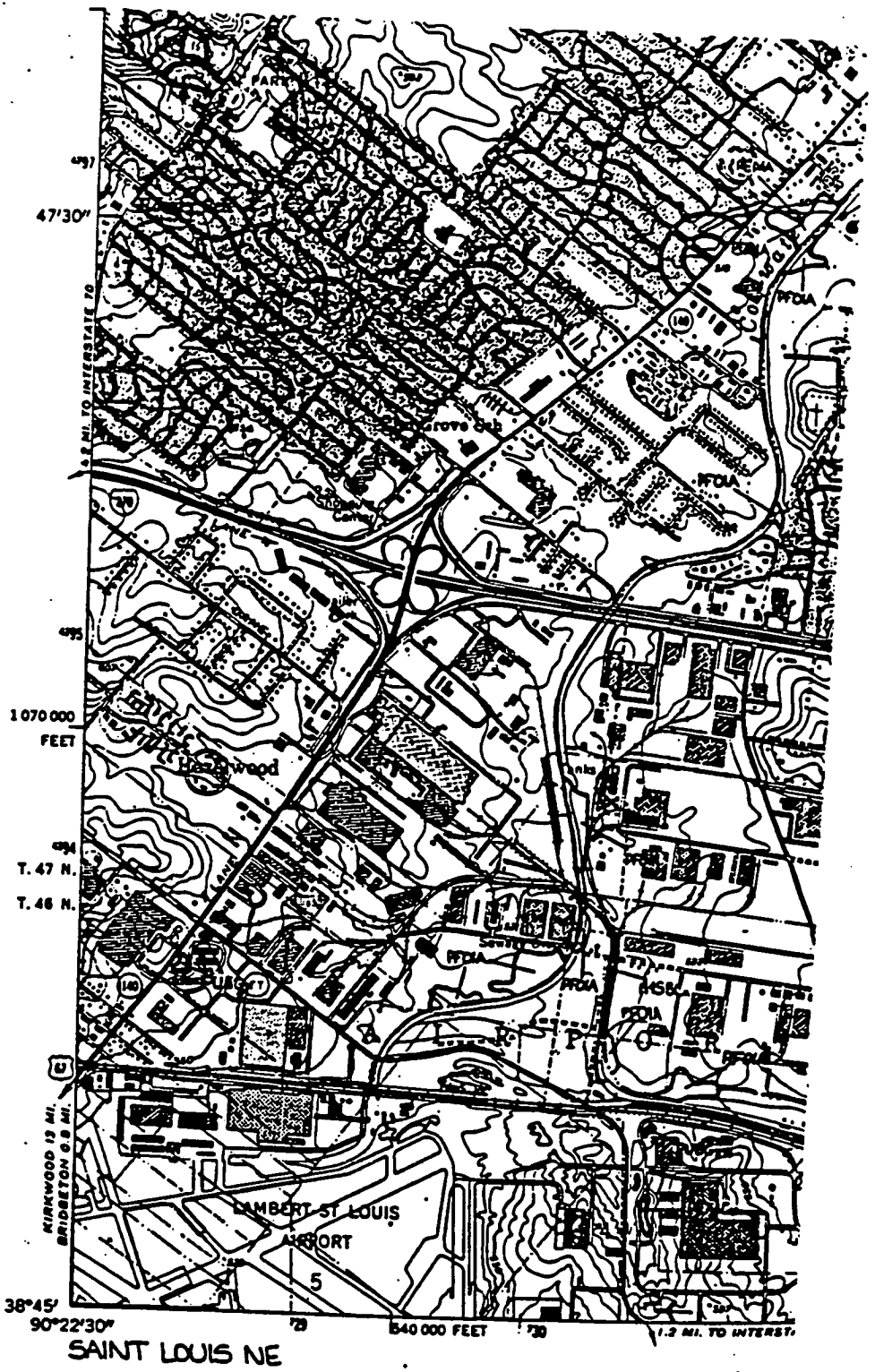

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Municipal Dock
MC KINLEY BRIDGE
(TOLL)

089094

MISSOURI DEPARTMENT OF CONSERVATION

MAILING ADDRESS
P.O. Box 180
Jefferson City, Missouri 65102-0180

STREET LOCATION
2901 West Truman Boulevard
Jefferson City, Missouri

Telephone: 314/751-4115
JERRY J. PRESLEY, Director

May 7, 1992

Mr. David G. Adler
Site Manager
Former Sites Restoration Division
Department of Energy
P. O. Box 2001
Oak Ridge, TN 37831

Dear Mr. Adler:

In response to your April 24, 1992 request for information on local aquatic and terrestrial flora and fauna at the St. Louis site, we queried the Heritage Data Base.

Enclosed are printouts from the database that include lists of rare and endangered species likely to occur in St. Louis County, and known fish and wildlife species likely to occur in St. Louis County. The lists include 37 rare and endangered species and 538 fish and wildlife species. In addition, I have enclosed a list of sensitive species and high quality natural communities known from St. Louis County.

The absence of further occurrences of sensitive species and natural communities does not mean that they do not occur within the impacted area, merely that no additional information is known at this time. This report should not be regarded as a final statement on the presence or absence of rare or endangered species or high quality natural communities; only an on-site inspection can verify the absence of existence of such species or communities.

I hope this response meets your needs.

Sincerely,

W. H. Dieffenbach

WILLIAM H. DIEFFENBACH
ASST. PLANNING DIVISION CHIEF

WHD:jct

Enclosure

089094

Department of Energy - St. Louis County

Two species occur in/along the Mississippi River and Missouri River in the vicinity of the sites identified by the Department of Energy.

Pallid sturgeon (Scaphirhynchus albus) is state and federal listed Endangered.

Overwintering bald eagles (Haliaeetus leucocephalus) are state and federal listed Endangered.

A complete list of sensitive species and high-quality natural communities is also provided. Except for the two species listed above, it is unlikely that any other Rare or Endangered species would be affected at these project sites.

In addition, a Procedures printout of all animals of St. Louis County is included.

Note: The list of animals of St. Louis is not included in this document due to the length of the list. Anyone may view this list by accessing the Heritage Data Base or by contacting the PDCC department at Bechtel International, Inc., Oak Ridge, Tennessee 37831; file number 089094.

94 053

Department of Energy
Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831–

1994 FEB 23 AM 9:18

FEB 14 1994

HISTORIC PRESERVATION PROGRAM

January 31, 1994

Mr. Michael S. Weichman
Senior Archaeologist, S.H.P.O.
Division of Natural Resources
P.O. Box 176
Jefferson City, MO 65102

Dear Mr. Weichman:

DOE is in the process of issuing a Feasibility Study for remedial action at the St. Louis Site, in accordance with CERCLA. Because the St. Louis Site project areas (downtown and airport) have undergone extensive disturbance during their long tenure as industrial sites, an archaeological survey will not be required for this project. However, the Mallinckrodt Downtown Site (SLDS) buildings will be analyzed for existing historic resources. Thus, DOE is conducting a cultural resources survey (CRS) of 16 buildings on the Mallinckrodt Chemical Company site in accordance with Section 106 requirements. This survey will include archival research in the State Historic Preservation Office archives, local and state libraries and historic societies, and in the Mallinckrodt site archives. On-site investigation and photography of the 16 buildings will also be conducted. A CRS report will be prepared which will contain a contextual historical narrative of the site, building descriptions, evaluation of the buildings for NRHP eligibility (which will be made both as individual sites and/or contributing buildings to an historic district related to Mallinckrodt Chemical Company, an important industrial corporation in St. Louis), analysis of impacts of the proposed project, and recommendations as necessary.

As stated in the Feasibility Study, the Department of Energy is performing the CRS and is committed to tailoring its remediation efforts to be in accordance with the requirements of Section 106 historical buildings resources that might be identified through the survey. This survey will satisfy the state historic preservation requirements for the project.

If you have any questions, please call me at (615) 576-9634.

Sincerely yours,

David G. Adler, Missouri Site Manager
Former Sites Restoration Division

SHPO Concurrence:
15 FEB 1994

APPENDIX C

RISK AND DOSE ASSESSMENT

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INTRODUCTION

A radiological risk and dose estimate of exposure during proposed removal activities at the St. Louis Airport Site (SLAPS) and the adjacent ballfields properties and for exposure to residual contaminants was performed for the Engineering Evaluation/Cost Analysis (EE/CA). The goal of this assessment is to provide a basis for evaluation of overall protection of human health and short-term effectiveness. The following sections discuss the major components of the assessment, including scenario definition, data evaluation, exposure assessment, and risk plus dose characterization. Because radionuclides are believed to drive risk and dose at these properties and due to the limited volume of chemical data, chemical risk is not evaluated in this assessment.

SCENARIO DEFINITIONS

The intent of this assessment is to consider remedial alternatives for material at the SLAPS and ballfield properties. Seven remedial alternatives are considered ranging from no action (Alternative 1) to remediation of both properties to 40 CFR 192 criteria[1] (Alternative 2C). Alternatives are defined in Table C-1 and include the option to use some soils containing low levels of contamination as backfill. Alternative 1 is the no action alternative which assumes SLAPS and the ballfields will be left in their current condition. Alternatives 2A, 2B, 2C, 3A, 3B and 3C consider the removal of material from all of SLAPS and the ballfields excluding the ditch north of McDonnell Boulevard (referred to from here on as just the ballfields). Subsurface cleanup levels of 50/100/150 pCi/g for radium-226/thorium-230/uranium-238 (Ra-226/Th-230/U-238) are set for 'A' Alternatives (i.e., Alternatives 2A and 3A). Subsurface cleanup levels are set to 15/40/50 pCi/g for 'B' alternatives and to 15/15/50 pCi/g 'C' alternatives. The surface cleanup level of 5/5/50 is set for all alternatives except Alternative 1. Alternative 1 is the no action alternative meaning that all materials would be left undisturbed in place.

Doses are calculated for two receptors, an industrial worker located on a future facility either at SLAPS or the ballfields, and a remediation worker involved in excavating contaminated material. Risk is estimated for the industrial worker but not the remediation worker, because

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[1]The sum of ratios (SOR) equation traditionally used at St. Louis properties is from DOE Order 5400.5 which includes limits for Th-230, Th-232 and a site-specific derived limit for U-238. Even though SLAPS is no longer a DOE site, the traditional SOR equation is used in this assessment because it is conservative and is familiar to stakeholders. The equation is:

$$\frac{\text{Ra} - 226 \text{ or Th} - 230}{5 / 15 \text{ pCi / g}} + \frac{\text{Ra} - 228 \text{ or Th} - 232}{5 / 15 \text{ pCi / g}} + \frac{\text{U} - 238}{50 \text{ pCi / g}} \geq 1$$

where 5 pCi/g is used as the limit in the top 6-inches of soil and 15 pCi/g is used for soil below 6-inches. Net concentrations are used (i.e., background is subtracted). The larger of Ra-226 and Th-230 is selected and the larger of Ra-228 or Th-232 is selected. This approach is consistent with CERCLA remediation goals in 40 CFR 192 (see OSWER Directive no. 9200.4-25) with the addition of the site specific uranium limit of 50 pCi/g. If other criteria are used (e.g., for Alternative 2A, the concentration limits are 50 pCi/g for Ra-226, 100 pCi/g for Th-230, and 150 pCi/g for U-238), the SOR equation changes to:

$$\frac{\text{Ra} - 226}{50 \text{ pCi / g}} + \frac{\text{Th} - 230}{100 \text{ pCi / g}} + \frac{\text{U} - 238}{150 \text{ pCi / g}} \geq 1$$

there are dose limits for radiation workers but no applicable risk limit. The industrial worker exposure is evaluated for all alternatives with a different estimate for exposure at SLAPS and at the ballfields. Industrial worker exposure is estimated both to consider whether any remedial activities are necessary to protect future site workers (streamlined risk evaluation) and to determine if level of remediation is necessary, if any, to meet risk and dose limits. The remediation worker dose was estimated for the worst case exposure scenario to show that remediation worker doses do not approach the 5,000 mrem/yr limit used by both the Nuclear Regulatory Commission (NRC) and the Department of Energy (DOE). Worst case exposure would occur while removing all material above the 15/15/50 pCi/g criteria across all of SLAPS and the ballfields (Alternatives 2C and 3C). Remediation worker dose is evaluated to assess the short-term effectiveness of remedial actions.

It is assumed that the soil targeted for below criteria backfill on SLAPS (including both overburden and soil below the surface criteria) does not require additional risk or dose calculations for either the industrial worker or the remediation worker. This assumption is based on the following logic:

- Soils targeted for below criteria backfill must have radionuclide concentrations that fall below the selected surface criteria,
- The subsurface criteria are less stringent than the surface criteria,
- Soil below criteria will be used to backfill SLAPS excavations (in the subsurface),
- All soil used as backfill will meet the selected subsurface criteria - because criteria are met, no dose calculations are necessary to estimate an industrial worker's exposure to those soils, and finally
- Remediation workers handling the excavated surface or overburden soil will be exposed to constituent radionuclides whether the soil is used for backfill or shipped off-site - no additional dose calculations are necessary.

DATA EVALUATION

To assess potential risks and doses to industrial and remediation workers, the St. Louis site database was queried to estimate exposure concentrations. For this assessment data from previous characterization efforts at SLAPS were aggregated into one data set. Data from the ballfields were aggregated into a separate data set. Scenario definitions were then considered to query the data further and produce estimates of radionuclide concentrations. For the remediation worker, only two data sets were created to represent worst case exposure conditions (under an Alternative 2C or 3C removal action). One data set contained all soils at SLAPS above the 15/15/50 pCi/g criteria and one contained all soils from the ballfields above the 15/15/50 criteria.

Because many variations are considered in evaluating industrial worker risk and dose, data sets are not explicitly defined here. In general, a source term for SLAPS was defined separately from the ballfield source term. Each set was defined by aggregating data from the entire SLAPS or ballfield property after modeling the respective removal. That is, for each alternative, the samples in the designated area and above the specified cleanup level were removed from consideration. The remaining data were then used to produce estimates of residual radionuclide concentrations. Concentrations used in dose calculations are property-wide estimates.

Having divided the data into data sets, exposure concentrations were then calculated. To be conservative and in following with EPA guidance, the 95 percent upper confidence limit on the mean (UCL_{95}) was used providing a reasonable confidence that the true average was not underestimated. The UCL_{95} minus background provided the reasonable maximum exposure (RME) concentration for use in dose calculations. For the St. Louis area, average background concentrations have been established as 0.9 pCi/g for Ra-226, 1.3 pCi/g for Th-230, 1.0 pCi/g for Th-232, and 1.1 pCi/g for U-238 (BNI 1990). U-235 was assumed to be present as 4.6% of the U-238 concentration, at its natural relative abundance.

In general, the St. Louis database contains concentrations for the primary radionuclides Ra-226, Th-230, Th-232, and U-238 but does not provide sufficient data for other relevant or secondary radionuclides such as actinium-227 (Ac-227), protactinium-231 (Pa-231), U-235, etc., typically found in St. Louis contaminated soil. To account for these radionuclides, the relationships established in Table 2.15 of the St. Louis Baseline Risk Assessment (DOE 1993) was used. This table takes advantage of summary data provided in a 1990 memorandum (Leidle 1990) and relates secondary radionuclide concentrations to primary radionuclide concentrations (the raw data supporting the summary tables is unpublished). Table C-2 lists UCL_{95} and RME calculations used to estimate risks and doses to the industrial and remediation workers. Note that concentrations vary little in the ballfields summaries. This is due to the fact that most of the contamination in the ballfields is concentrated in the surface soils that are removed to Ra-226/Th-230/U-238 = 5/5/50 pCi/g under alternatives except Alternative 1.

EXPOSURE ASSESSMENT

All risks and doses were calculated using the RESRAD code version 5.621 (Yu, Zielen et al. 1993). Scenarios considered for the assessment are an industrial worker and a remedial worker. Each of these receptors is defined for risk and dose modeling using standard parameter values accepted by the EPA or conservative RESRAD defaults that tend to produce results that likely overestimate actual dose. Receptors are described in more detail below. Primary exposure parameters used to model each receptor are listed in Table C-3.

Industrial Worker

The industrial worker is assumed to work a standard work year (2,000 hours) at a future facility constructed at SLAPS or on the ballfields. It is assumed that this worker holds a position at the facility for 25 years. It is also assumed that he spends 50 percent of his time on site indoors

and the remaining 50 percent outdoors. He inhales 8,400 m^3 of air per year, ingests 36.5 grams of soil per year, and receives water from an off-site municipal source. (Groundwater is not within the scope of this document and will addressed under the site-wide feasibility study.). It is assumed that residual soils are left uncovered (cover depth equals zero). Exposure pathways include dust inhalation, soil ingestion, and direct gamma radiation.

Remediation Worker

The remediation worker is exposed to contaminated soil while excavating the entire SLAPS and ballfield properties to the 15/15/50 pCi/g criteria. It is assumed (from cost estimate calculations) that excavations will take longer than one calendar year. A 2,000 hour work year is, therefore, assumed. The remediation worker's inhalation and soil ingestion rates are assumed to be 12,300 m^3 per year and 175 grams per year, respectively. Exposure pathways include soil ingestion, particulate inhalation, and direct gamma.

RISK AND DOSE CHARACTERIZATION

Potential risks and doses to the industrial worker and remedial worker are summarized in Table C-4. The estimated risks to the industrial worker at he ballfields are in the 10^{-5} range and are, therefore, within the CERCLA risk range of 10^{-4} to 10^{-6}. Estimated risks at SLAPS include 2×10^{-3} (no action), 1×10^{-4} (remove 50/100/150), 9×10^{-5} (remove 15/40/50), and 8×10^{-5} (remove (15/15/50). Of the excavation alternatives, none exceed the 3×10^{-4} upper boundary of the CERCLA risk range. Results also show that if an industrial worker is exposed to radionuclides at the ballfields under any of the alternatives considered, dose estimates are lower than the 100 mrem/yr limit recommended by the International Commission on Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurements (NCRP), the Nuclear Regulatory Commissions (NRC) decommissioning limit of 25 mrem/yr, and the Department of Energy (DOE) proposed limit of 30 mrem/yr.

Under Alternative 1 the industrial worker is estimated to receive a dose of approximately 300 mrem/yr. Under Alternatives 2 and 3, doses range from 11 to 16 mrem/yr. All doses for Alternatives 2 and 3 are below ICRP, NCRP, NRC, and DOE criteria , and there appears to be little or no difference in the Alternative 2 and 3 doses. This fact indicates that overburden soils or soils that contain radioactivity below designated action levels may be used to backfill excavations without a significant detriment.

The maximum estimated dose to the remediation worker is approximately 840 mrem/yr. This dose was calculated using highly conservative assumptions (e.g., no dust suppression, hand digging assumed, etc.) and is provided to show that even under worst case exposure conditions, remediation worker dose limits are not exceeded. The total dose rate of 840 mrem/yr is much less than the 5,000 mrem/yr limit used by the NRC and DOE and would likely be much less using less conservative (more realistic) assumptions.

Calculations in this assessment are designed to provide conservative estimates of dose by using upper bound concentrations and occupancies, and conservative inhalation and soil ingestion rates. Actual risks and doses for all receptors would likely be less than those predicted here with the estimates listed in Table C-4 representing conservative worst case scenarios.

Table C-1. Remediation Alternative Definitions

Alternative Name and Description	Cleanup Criteria					
	Radium-226 (pCi/g)		Thorium-230 (pCi/g)		Uranium-238 (pCi/g)	
	Surface (top 6-in.)	Subsurface (> 6-in.)	Surface (top 6-in.)	Subsurface (> 6-in.)	Surface (top 6-in.)	Subsurface (> 6-in.)
Alternative 1: No Action	N/A [a]	N/A	N/A	N/A	N/A	N/A
Alternative 2A and 3A[b]: Excavation of SLAPS and the Ballfields [c]	5	50	5	100	50	150
Alternative 2B and 3B[b]: Excavation of SLAPS and the Ballfields [c]	5	15	5	40	50	50
Alternative 2C and 3C[b]: Excavation of SLAPS and the Ballfields [c]	5	15	5	15	50	50

[a] Not applicable
[b] Alternative 3 includes soils below the surface criteria to partially backfill excavated areas at SLAPS. Otherwise, all soils will be shipped to an off-site disposal area.
[c] The ditch north of McDonnell Boulevard is not included.

Table C-2. RME Concentrations of Radionuclides in the Source Term

SLAPS (Alternative 1)					Industrial Worker	Ballfields (Alternative 1)					Industrial Worker
Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]	Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]
Ac-227		0.92	51	0.051	51	Ac-227		0.92	1.4	0.051	1.3
Pa-231		1.7	95	0.051	95	Pa-231		1.7	2.6	0.051	2.5
Pb-210		1.0	56	0.90	55	Pb-210		1.0	1.5	0.90	0.60
Ra-226	55.8	1.0	56	0.90	55	Ra-226	1.50	1.0	1.5	0.90	0.60
Ra-228		0.28	0.86	1.0	-0.14	Ra-228		0.28	0.52	1.0	-0.48
Th-228		0.85	2.6	1.0	1.6	Th-228		0.85	1.6	1.0	0.58
Th-230	247	1.0	247	1.3	246	Th-230	6.68	1.0	6.7	1.3	5.4
Th-232	3.06	1.0	3.1	1.0	2.1	Th-232	1.86	1.0	1.9	1.0	0.86
U-234		1.0	49	1.1	48	U-234		1.0	7.5	1.1	6.4
U-235		0.046	2	0.051	2.2	U-235		0.046	0.34	0.051	0.29
U-238	49.4	1.0	49	1.1	48	U-238	7.47	1.0	7.5	1.1	6.4
SLAPS (Alternative 2A)					Industrial Worker	Ballfields (Alternative 2A)					Industrial Worker
Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]	Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]
Ac-227		0.92	2.3	0.051	2.2	Ac-227		0.92	1.3	0.051	1.3
Pa-231		1.7	4.2	0.051	4.1	Pa-231		1.7	2.5	0.051	2.4
Pb-210		1.0	2.5	0.90	1.6	Pb-210		1.0	1.5	0.90	0.6
Ra-226	2.5	1.0	2.5	0.90	1.6	Ra-226	1.45	1.0	1.5	0.90	0.6
Ra-228		0.28	0.67	1.0	-0.33	Ra-228		0.28	0.50	1.0	-0.50
Th-228		0.85	2.0	1.0	1.0	Th-228		0.85	1.5	1.0	0.52
Th-230	13	1.0	13	1.3	12	Th-230	2.85	1.0	2.9	1.3	1.6
Th-232	2.4	1.0	2.4	1.0	1.4	Th-232	1.79	1.0	1.8	1.0	0.8
U-234		1.0	19	1.1	18	U-234		1.0	7.4	1.1	6.3
U-235		0.046	0.89	0.051	0.8	U-235		0.046	0.34	0.051	0.29
U-238	19.4	1.0	19	1.1	18	U-238	7.38	1.0	7.4	1.1	6.3

Table C-2. RME Concentrations of Radionuclides in the Source Term (continued)

SLAPS (Alternative 2B)					Industrial Worker	Ballfields (Alternative 2B)					Industrial Worker
Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]	Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]
Ac-227		0.92	1.9	0.051	1.8	Ac-227		0.92	1.3	0.051	1.3
Pa-231		1.7	3.4	0.051	3.4	Pa-231		1.7	2.5	0.051	2.4
Pb-210		1.0	2.0	0.90	1.1	Pb-210		1.0	1.5	0.90	0.55
Ra-226	2.0	1.0	2.0	0.90	1.1	Ra-226	1.45	1.0	1.5	0.90	0.55
Ra-228		0.28	0.64	1.0	-0.36	Ra-228		0.28	0.50	1.0	-0.50
Th-228		0.85	1.9	1.0	0.94	Th-228		0.85	1.5	1.0	0.52
Th-230	6.97	1.0	7.0	1.3	5.7	Th-230	2.85	1.0	2.9	1.3	1.6
Th-232	2.28	1.0	2.3	1.0	1.3	Th-232	1.79	1.0	1.8	1.0	0.79
U-234		1.0	15	1.1	14	U-234		1.0	7.4	1.1	6.3
U-235		0.046	0.7	0.051	0.7	U-235		0.046	0.34	0.051	0.29
U-238	15.4	1.0	15	1.1	14	U-238	7.38	1.0	7.4	1.1	6.3
SLAPS (Alternative 2C)					Industrial Worker	Ballfields (Alternative 2C)					Industrial Worker
Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]	Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]
Ac-227		0.92	1.8	0.051	1.7	Ac-227		0.92	1.3	0.051	1.3
Pa-231		1.7	3.3	0.051	3.2	Pa-231		1.7	2.5	0.051	2.4
Pb-210		1.0	1.9	0.90	1.0	Pb-210		1.0	1.5	0.90	0.55
Ra-226	1.9	1.0	1.9	0.90	1.0	Ra-226	1.45	1.0	1.5	0.90	0.55
Ra-228		0.28	0.60	1.0	-0.40	Ra-228		0.28	0.50	1.0	-0.50
Th-228		0.85	1.8	1.0	0.84	Th-228		0.85	1.5	1.0	0.52
Th-230	4.32	1.0	4.3	1.3	3.0	Th-230	2.63	1.0	2.6	1.3	1.3
Th-232	2.16	1.0	2.2	1.0	1.2	Th-232	1.79	1.0	1.8	1.0	0.79
U-234		1.0	13	1.1	12	U-234		1.0	7.4	1.1	6.3
U-235		0.046	0.6	0.051	0.6	U-235		0.046	0.34	0.051	0.29
U-238	13.2	1.0	13	1.1	12	U-238	7.39	1.0	7.4	1.1	6.3

Table C-2. RME Concentrations of Radionuclides in the Source Term (continued)

SLAPS (Alternative 3A)					Industrial Worker	Ballfields (Alternative 3A)					Industrial Worker
Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[c]	Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]
Ac-227		0.92	2.4	0.051	2.3	Ac-227		0.92	1.3	0.051	1.3
Pa-231		1.7	4.4	0.051	4.3	Pa-231		1.7	2.5	0.051	2.4
Pb-210		1.0	2.6	0.90	1.7	Pb-210		1.0	1.5	0.90	0.55
Ra-226	2.58	1.0	2.6	0.90	1.7	Ra-226	1.45	1.0	1.5	0.90	0.55
Ra-228		0.28	0.67	1.0	-0.33	Ra-228		0.28	0.50	1.0	-0.50
Th-228		0.85	2.0	1.0	1.0	Th-228		0.85	1.5	1.0	0.52
Th-230	13.7	1.0	14	1.3	12	Th-230	2.84	1.0	2.8	1.3	1.5
Th-232	2.39	1.0	2.4	1.0	1.4	Th-232	1.79	1.0	1.8	1.0	0.79
U-234		1.0	20	1.1	19	U-234		1.0	7.4	1.1	6.3
U-235		0.046	0.9	0.051	0.9	U-235		0.046	0.34	0.051	0.29
U-238	19.9	1.0	20	1.1	19	U-238	7.39	1.0	7.4	1.1	6.3
SLAPS (Alternative 3B)					Industrial Worker	Ballfields (Alternative 3B)					Industrial Worker
Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]	Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]
Ac-227		0.92	1.9	0.051	1.9	Ac-227		0.92	1.3	0.051	1.3
Pa-231		1.7	3.5	0.051	3.5	Pa-231		1.7	2.5	0.051	2.4
Pb-210		1.0	2.1	0.90	1.2	Pb-210		1.0	1.5	0.90	0.55
Ra-226	2.08	1.0	2.1	0.90	1.2	Ra-226	1.45	1.0	1.5	0.90	0.55
Ra-228		0.28	0.64	1.0	-0.36	Ra-228		0.28	0.50	1.0	-0.50
Th-228		0.85	1.9	1.0	0.93	Th-228		0.85	1.5	1.0	0.52
Th-230	7.13	1.0	7.1	1.3	5.8	Th-230	2.84	1.0	2.8	1.3	1.5
Th-232	2.27	1.0	2.3	1.0	1.3	Th-232	1.79	1.0	1.8	1.0	0.79
U-234		1.0	16	1.1	15	U-234		1.0	7.4	1.1	6.3
U-235		0.046	0.7	0.051	0.7	U-235		0.046	0.34	0.051	0.29
U-238	16.1	1.0	16	1.1	15	U-238	7.39	1.0	7.4	1.1	6.3

Table C-2. RME Concentrations of Radionuclides in the Source Term (continued)

SLAPS (Alternative 3C)					Industrial Worker	Ballfields (Alternative 3C)					Industrial Worker
Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]	Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]
Ac-227		0.92	1.9	0.051	1.8	Ac-227		0.92	1.3	0.051	1.3
Pa-231		1.7	3.5	0.051	3.4	Pa-231		1.7	2.5	0.051	2.4
Pb-210		1.0	2.0	0.90	1.1	Pb-210		1.0	1.5	0.90	0.55
Ra-226	2.04	1.0	2.0	0.90	1.1	Ra-226	1.45	1.0	1.5	0.90	0.55
Ra-228		0.28	0.60	1.0	-0.40	Ra-228		0.28	0.50	1.0	-0.50
Th-228		0.85	1.8	1.0	0.84	Th-228		0.85	1.5	1.0	0.51
Th-230	4.27	1.0	4.3	1.3	3.0	Th-230	2.85	1.0	2.9	1.3	1.6
Th-232	2.16	1.0	2.2	1.0	1.2	Th-232	1.78	1.0	1.8	1.0	0.78
U-234		1.0	14	1.1	13	U-234		1.0	7.4	1.1	6.3
U-235		0.046	0.7	0.051	0.6	U-235		0.046	0.34	0.051	0.29
U-238	14.2	1.0	14	1.1	13	U-238	7.40	1.0	7.4	1.1	6.3
SLAPS (Alternative 2C)					Remediation Worker	Ballfields (Alternative 2C)					Remediation Worker
Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]	Analyte	True UCL_{95} (pCi/g)[a]	Multiplier[b]	Estimated UCL_{95} (pCi/g)	Bkg (pCi/g)[c]	REM (pCi/g)[d]
Ac-227		0.92	74	0.051	74	Ac-227		0.92	1.6	0.051	1.5
Pa-231		1.7	137	0.051	137	Pa-231		1.7	2.9	0.051	2.9
Pb-210		1.0	80	0.90	80	Pb-210		1.0	1.7	0.90	0.82
Ra-226	80.4	1.0	80	0.90	80	Ra-226	1.72	1.0	1.7	0.90	0.82
Ra-228		0.28	0.98	1.0	-0.02	Ra-228		0.28	0.58	1.0	-0.42
Th-228		0.85	3.0	1.0	2.0	Th-228		0.85	1.8	1.0	0.75
Th-230	371	1.0	371	1.3	370	Th-230	15.2	1.0	15	1.3	14
Th-232	3.51	1.0	3.5	1.0	2.5	Th-232	2.06	1.0	2.1	1.0	1.1
U-234		1.0	66	1.1	65	U-234		1.0	7.9	1.1	6.8
U-235		0.046	3.0	0.051	3.0	U-235		0.046	0.36	0.051	0.31
U-238	66.1	1.0	66	1.1	65	U-238	7.85	1.0	7.9	1.1	6.8

[a] UCL_{95} value taken from site database

[b] Multiplier taken from Table 2.15 of the Baseline Risk Assessment (DOE 1993). Ac-227, Pa-231, and Pb-210 multipliers all multiplied by the Ra-226 True UCL_{95}. Ra-228 and Th-228 multipliers multiplied by the Th-232 True UCL_{95}. U-234 and U-235 multipliers multiplied by the U-238 True UCL_{95}.

[c] Background values for Ra-226 (0.9 pCi/g), Th-230 (1.3 pCi/g), Th-232 (1.0 pCi/g), and U-238 (1.1 pCi/g) are provided in a 1990 characterization report (BNI 1990). Radionuclides without a known background concentration are assumed to be in equilibrium with its nearest parent. U-235 and decay products are assumed to present in background at 4.6 % of the U-238 concentration (natural abundance assumed).

[d] RME = (Estimated UCL_{95}) - (Background)

Table C-3. Site and Scenario Specific Parameters

Parameter	Industrial Worker	Remediation Worker	Source/Comment
Inhalation Rate (m^3/yr)	8,400	12,300	Industrial Worker: conservative RESRAD default Remediation Worker: Yu, Loureiro et al. 1993. Typical mix of outdoor activities
Soil ingestion Rate (g/yr)	36.5	175	Industrial Worker: RESRAD default Remediation Worker: EPA 1991 rate associated with construction and landscaping activities
Exposure Duration (years)	25	1	Industrial Worker: EPA 1991 reasonable upper bound for one work place Remediation Worker: excavations take place during one calendar year
Mass Loading for Inhalation (g/m^3)	2×10^{-4}	2×10^{-4}	Conservative RESRAD default that assumes there are periods of heavy dust loading
Time on-site and indoors (hours)	1,000	0.0	Industrial Worker: assuming 4 hours per day indoors 250 days per year Remediation Worker: no indoor exposure assumed
Time on-site and outdoors (hours)	1,000	2,000	Industrial Worker: assuming 4 hours per day outdoors 250 days per year Remediation Worker: standard work year assumed.

Table C-4. Dose and Risk Estimates by Alternative

Maximum Estimated Doses to the Industrial Worker for Given Area and Alternative (mrem/yr)							
Site	Alt 1	Alt 2A	Alt 2B	Alt 2C	Alt 3A	Alt 3B	Alt 3C
	No Action	(50/100/150)	(15/40/50)	(15/15/50)	(15/15/50)	(15/40/50)	(50/100/150)
SLAPS	292	16	12	11	16	13	12
Ballfields	8.2	7.4	7.4	7.4	7.4	7.4	7.4
Maximum Estimated Risks to the Industrial Worker for Given Area and Alternative (lifetime^{-1})							
Site	Alt 1	Alt 2A	Alt 2B	Alt 2C	Alt 3A	Alt 3B	Alt 3C
	No Action	(50/100/150)	(15/40/50)	(15/15/50)	(15/15/50)	(15/40/50)	(50/100/150)
SLAPS	2.1E-03	1E-4	9E-5	8E-5	1.2E-04	9E-05	9E-05
Ballfields	6.3E-05	5E-05	5E-05	5E-05	5E-05	5E-05	5E-05
Maximum Estimated Dose to the Remediation Worker (mrem/yr)							
SLAPS	0.0	<[a]	<	<	820	<	<
Ballfields	0.0	<	<	<	20	<	<
Total	0.0	<	<	<	840	<	<

[a] Less than the maximum dose of 840 mrem/yr estimated for Alternatives 4C and 5C (15/15/50).

REFERENCES

Bechtel National, Inc. (BNI) 1990. *Radiological Characterization Report for FUSRAP Properties in the St. Louis, Missouri Area.* prepared for the Department of Energy, DOE/OR/23701-41.1, Oak Ridge, Tennessee, August.

DOE 1993. *Baseline Risk Assessment for Exposure to Contaminants at the St. Louis Site, St. Louis, Missouri.* DOE/OR/23701-41.1, Oak Ridge, Tennessee, November.

EPA 1991. *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance "Standard Default Exposure Factors" Interim Final.* OSWER Directive 9285.6-03, Washington, D.C., March.

Liedle, S.D., 1990. *Input for St. Louis Baseline Risk Assessment Study.* Letter from S.D. Liedle (Bechtel National, Inc., Oak Ridge, Tennessee) to M. Pichel (Argonne National Laboratory, Argonne, Illinois), May 29.

Yu, C., C. Loureiro, J.-J. Cheng, L.G. Jones, Y.Y. Wang, Y.P. Chia, and E. Faillace 1993. *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil.* ANL/EAIS-8, Argonne, Illinois, April.

Yu, C., A.J. Zielen, J.-J. Cheng, Y.C. Yuan, L.G. Jones, D.J. LePoire, Y.Y. Wang, C.O. Loureiro, E. Gananapragasam, E. Faillace, A. Wallo III, W.A. Williams, and H. Peterson 1993. *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0.* ANL/EAD/LD-2. Argonne National Laboratory, Argonne, Illinois, September.

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APPENDIX D

ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) FOR THE ST. LOUIS AIRPORT SITE (SLAPS)

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D.1 INTRODUCTION

This appendix provides information regarding the cost estimate for the detailed analysis of alternatives for the SLAPS EE/CA. These costs are not intended to provide a construction estimate for the remedial actions. The costs used in this analysis are based on Means Heavy Construction Cost Data (Means 1996), vendor quotes, and engineering estimates. Productivity adjustments are incorporated to compensate for lost productivity due to construction delays and safety requirements imposed due to impacted soil. These cost estimates are expected to provide an accuracy of -30 percent to +50 percent and are prepared using data available from the RI. The detail used to develop these costs should provide much more certainty (±20 percent) if the assumptions prove accurate.

These cost estimates should be used only for the detailed analysis of alternatives. Legal costs, siting studies, treatability testing, and the documentation of environmental impacts, including the NEPA public review process, could affect the cost estimates presented in this EE/CA. The actual costs for these actions may be higher than estimated due to the large uncertainty in administrative costs and potential delays in implementing the action. Additionally, many costs are based on unproven treatment technologies or non-negotiated transportation costs and could vary widely. The maximum total expenditure has not been established for this project. Remaining items include environmental impact assessments, studies, or delays related to the disposal alternatives.

Format for the cost estimate is based on guidance from EPA documents. Section D.2 provides general cost information. This section includes information on the scope of the estimates, the Work Breakdown Structure (WBS), the Project schedules, the estimating methodology, the assumptions and key parameters, and an explanation of the direct and indirect capital costs and the operation and maintenance costs. Section D.3 includes the total 1998 costs for each alternative.

D.2 GENERAL COST INFORMATION

D.2.1 ESTIMATE SCOPE

Scope is defined by the WBS elements for which costs have been estimated for each alternative. Costs are estimated for all WBS elements listed in Section D.2.2 except for WBS 1.1.1, Project Screening and Assessment and WBS 1.2, Discovery and Designation. Those elements are not included as they represent costs which are largely expended and thus, are considered sunk. Costs are estimated over a 30-year project life cycle for each alternative.

D.2.2 WORK BREAKDOWN STRUCTURE

The SAIC FUSRAP Work Breakdown Structure (WBS), June 6, 1994 was used as a basis to develop the St. Louis WBS (see Appendix Table D-1). The WBS is designed to subdivide the St. Louis Project into logical elements for cost estimating and to incorporate the project into the overall FUSRAP Program.

D.2.3 PROJECT SCHEDULE

Remediation activities could continue indefinitely for certain alternatives, however, major activities are typically complete within 20 to 30 years. For this reason, and to make the task of estimating feasible, all estimates are based on a 30-year project life cycle. Also, schedules for major construction activities are assumed to be constant and do not change between alternatives. This assumption also facilitates cost comparisons between alternatives. Specific schedules are calculated or based on engineering judgment.

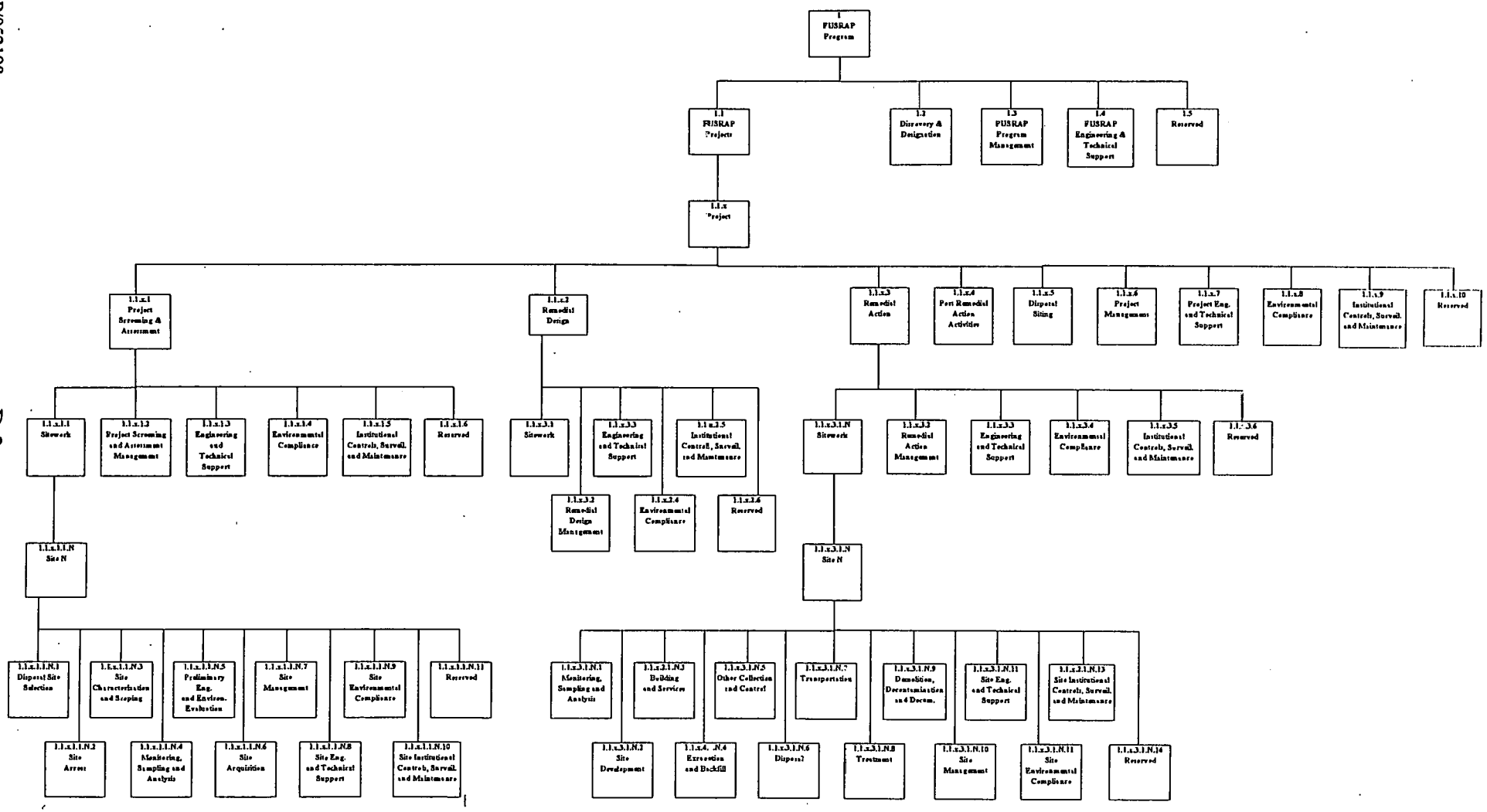
D.2.4 ESTIMATING METHODOLOGY

In general, FUSRAP cost estimates are generated for each of the activity-oriented WBS elements identified in Section D.2.2. However, due to the composition of the St. Louis site, many WBS elements are further subdivided in order to provide further visibility and definition (e.g., subsurface, vicinity properties, etc.). Once estimated, costs are then "rolled up" from subordinate level WBS elements and summed to the parent level WBS element. Use of the WBS in this manner provides traceability from the total cost down to very specific estimate details.

The primary methodology utilized is of a quantity take-off nature whereby costs are calculated based on unit cost multiplied by quantity or other input parameters. Unit cost data used in the relationship is primarily drawn from the *Means Heavy Construction Cost Data (Means 1996)*. An example of this is WBS 1.1.1.3.1.2, Site Development which is based on site requirements for ditches, rail spur renovation and other similar activities. Costs for this WBS are generated on a cost per quantity of labor and material. As another example, WBS 1.1.1.3.1.4, Excavation and Backfill is based on excavation volume as well as site specific complexities. This combination of volume and complexity in turn drives equipment, labor and material requirements.

Several WBS elements incorporate a productivity adjustment process as part of the estimating methodology. This process is accomplished through the use of factors which are applied to equipment performance measures in order to account for a degradation in the productivity, performance, or output levels of the equipment resulting from site-specific conditions. Productivity factors exist for three conditions: site, soil, and safety. Site adjustments are made to account for temporary work interruptions and delays resulting from poor weather, unsafe work conditions and other similar unforeseen events. Soil adjustments are made to account for varying levels of difficulty associated with excavating different types of soil or rubble. A safety adjustment is made to adjust productivity levels due to safety procedures associated with the radioactive nature

Table D-1. FUSRAP - WBS Summary



of impacted materials. Productivity adjustments are part of the methodology used to estimate costs for WBS 1.1.1.3.1.4 - Excavation and Backfill, and WBS 1.1.1.3.1.7 - Transportation (loading).

A contingency factor of 25 percent is applied to WBS element 1.1.1 - SLAPS Project (total project cost). WBS element 1.3 - FUSRAP Program Management and Integration is calculated using a 10-percent factor based on WBS element 1.1.1 with contingency added.

In general, estimating methodology is not site- or alternative-specific. Once a methodology has been established for a given WBS element, it becomes the common methodology which is employed for that given WBS element across the various sites and alternatives.

D.2.5 KEY PARAMETERS, GROUNDRULES, AND ASSUMPTIONS

Key parameters are quantities, unit costs and assumptions which tend to drive the ultimate cost for a project. Key parameters for the SLAPS are shown in Table D-2 in 1996 dollars. A factor is added to the overall estimate to convert it to 1998 dollars.

Groundrules and assumptions are statements of guidance and/or logic which are established in order to bound or limit the cost estimate. They serve to define the estimate by clarifying the effort which the estimate addresses and how cost for that effort is derived. Listed below are groundrules and assumptions which are common to all alternatives estimated for the SLAPS. Groundrules and assumptions are either WBS element-specific or site-specific and, as such, are not included here for the sake of document brevity. The following established statements for common groundrules and assumptions for the SLAPS are listed below.

- No sunk costs.
- All costs are reported in Base Year 1998 dollars in thousands unless otherwise noted.
- Escalation indices used are as reported in DOE-OR (FSRD) letter dated February 10, 1994; Subject: FY 1995 Unified Budget Call.
- Subcontractor material costs include a 10-percent material handling overhead (Means).
- Subcontractor labor costs include a 57-percent overhead (Means).
- Contingency factor of 25 percent is applied to WBS element 1.1.1 - SLAPS FUSRAP Project (total project cost).
- WBS element 1.3 - FUSRAP Program Management and Integration is calculated using a 10-percent factor based on WBS element 1.1.1 with contingency added.
- Escalation factor from \$95 to \$96, \$96 to \$97, and \$97 to \$98 is 1.036.

Table D-2. St. Louis Site Key Parameters

PARAMETER	Alt. 1 No Action	Alt. 2A &3A Excavation, Disposal / Below Criteria Backfill (5/50,5/100,50/150)	Alt. 2B & 3B Excavation, Disposal / Below Criteria Backfill (5/15,5/40,50/50)	Alt. 2C & 3C Excavation, Disposal / Below Criteria Backfill (5/15,5/15,50/50)
Impacted Insitu Volume (Insitu cy)		107,018	170,909	269,858
Excavation Volume, Total (insitu cy)		128,422	205,091	323,830
Excavation Volume, Total (exsitu cy)		160,527	256,364	404,787
Volume of Gabion Wall to be removed (insitu cy)		444	444	444
Volume of Below Criteria Backfill (exsitu cy)		16,053	25,636	40,479
Expansion Factor, Soil		1.25	1.25	1.25
Expansion Factor, Asphalt / Concrete		1.25	1.25	1.25
Expansion Factor, Rubble		1.25	1.25	1.25
Density, Soil (tons/insitu cy)		1.6	1.6	1.6
Density, Asphalt / Concrete (tons/insitu cy)		2.1	2.1	2.1
Density, Rubble (tons/insitu cy)		2.1	2.1	2.1
Soil Disposal Volume, Alt. 2 (exsitu cy)		160,527	256,364	404,787
Debris Disposal Volume, Total (exsitu cy)		0	0	0
Soil Disposal Volume, Alt. 3 (exsitu cy)		144,474	230,727	364,308
Disposal Rate ($/cy)		$ 149.00	$ 149.00	$ 149.00
Loading Rate ($/cy)		$ 25.00	$ 25.00	$ 25.00
Gondola (St. Louis) ($/ton)		$ 67.00	$ 67.00	$ 67.00
Intermodal (St. Louis) ($/ton)		$ 143.00	$ 143.00	$ 143.00
Gondola Transportation %		100%	100%	100%
Intermodal Transportation %		0%	0%	0%
Trips per day per dump truck		6	6	6
Available construction weeks per year		44	44	44

- Data sources for key parameters include the Volume Register, Rev. 11 (BNI 1997), this EE/CA for the SLAPS, and engineering judgment from SAIC.
- Source for equipment cost and output is Means unless otherwise cited.
- Productivity adjustments used in many elements for weather and other delays.
- Expansion factor for ex situ/in situ soil is 1.25. An additional 20% is added for expected overexcavation.
- PPE cost = $3.75 per labor hour (Source: Hazardous Waste Control by Richard Selg).
- Remedial action down time calculated based on 3 months of down time for every 9 months of working time.
- Disposal fees based on assumed volume discounts from the waste disposal contractor.

D.2.6 COST ESTIMATION

Federal construction programs have traditionally distinguished between the capital and operations and maintenance (O&M) costs. The remedial action alternatives for the SLAPS EE/CA consist of those activities required to prevent or mitigate the migration of waste into the environment. The remedial action may include activities considered to be O&M in situations where construction alone will not achieve the health and environmental protection criteria.

The remedial action will have a schedule with a defined completion date. The post-closure or O&M phase occurs after the completion of the remedial action and includes those activities necessary to confirm closure of the remedial action or the activities necessary to monitor and prevent migration of releases of hazardous waste into the environment for an indefinite period.

D.2.6.1 Capital Costs

Capital costs are those expenditures required to implement a remedial action and consist of both direct and indirect costs. Capital costs do not include the costs required to maintain or operate the action throughout its lifetime.

D.2.6.1.1 Direct Capital Costs

Direct capital costs include equipment, labor, and material necessary for implementing the remedial action. These typically include costs for:

- site development;
- building and services;

- excavation and backfill;
- other collection and control;
- disposal;
- transportation;
- treatment; and
- demolition, decontamination and decommissioning.

D.2.6.1.2 Indirect Capital Costs

Indirect capital costs consist of engineering, supervision, management, administration, financial and other services necessary to implement a remedial action. These costs are not incurred as part of actual remedial actions but are ancillary to direct or construction costs. Indirect costs typically include:

- remedial design;
- site and project management;
- site and project engineering and technical support;
- site and project environmental compliance;
- site and project institutional controls, surveillance and maintenance;
- program management and technical support.

D.2.6.2 Operations and Maintenance (O&M) Costs

Operation and maintenance costs are those post-remedial action costs necessary for monitoring and ensuring hazardous waste will not migrate into the environment. These costs typically include:

- monitoring, sampling and analysis;
- institutional controls;
- project management/engineering and technical support in support of O&M activities;
- program management and technical support in support of O&M activities.

D.3 REMEDIAL ACTION ALTERNATIVE COST SUMMARIES

Table D-3 provides a cost breakdown in fiscal year 1998 dollars by activity for each alternative sorted to compare disposal options.

Table D-3. FUSRAP Remediation Alternatives Summary Table for the St. Louis Site

Costs in Thousands FY98$

WBS NAME	Alt. 1 No Action	Alt. 2A Excavation & Disposal (5/50,5/100,50/150) (107,018 cy) *	Alt. 3A Excavation, Disposal with Below Criteria Backfill (5/50,5/100,50/150) (107,018 cy)*	Alt. 2B Excavation & Disposal (5/15,5/40,50/150) (170,909 cy)*	Alt. 3B Excavation, Disposal with Below Criteria Backfill (5/15,5/40,50/150) (170,909 cy)*	Alt. 2C Excavation & Disposal (5/15,5/15,50/50) (269,858 cy)*	Alt. 3C Excavation, Disposal with Below Criteria Backfill (5/15,5/15,50/50) (269,858 cy)*
Excavation & Backfill	0	12,791,109	12,586,148	16,511,410	16,184,085	22,273,099	21,756,267
Transportation	0	19,355,138	17,419,625	30,910,383	27,819,345	48,806,172	43,925,555
Disposal	0	23,912,102	21,520,892	38,187,907	34,369,116	60,297,072	54,267,364
Monitoring, Sampling and Analysis	0	1,280,996	3,228,022	1,554,555	4,663,978	2,129,529	7,039,175
Site Development	0	427,292	427,292	427,292	427,292	427,292	427,292
Building & Services	0	650,859	650,859	663,929	663,929	684,170	684,170
Treatment	0	18,916	18,916	18,916	18,916	18,916	18,916
Demolition and Decontamination	0	-	-	-	-	-	-
Project Management & Engineering Support	0	3,080,352	3,080,352	4,113,515	4,113,515	5,713,590	5,713,590
Other Collection and Controls	0	122,298	122,298	122,298	122,298	122,298	122,298
Onsite Management and Engineering Support	0	2,417,523	2,417,523	3,228,370	3,228,370	4,484,141	4,484,141
Site Inst. Controls, Surveillance & Maint.	0	38,397	38,397	51,276	51,276	71,221	71,221
Remedial Design	0	1,774,739	1,948,945	2,257,804	2,536,014	3,021,067	3,460,348
Subtotal Project	0	65,869,722	63,459,269	98,047,654	94,198,133	148,048,566	141,970,337
Contingency	0	16,467,430	15,864,817	24,511,913	23,549,533	37,012,141	35,492,584
Program Management and Integration	0	8,233,715	7,932,409	12,255,957	11,774,767	18,506,071	17,746,292
Total Removal Action	0	90,570,867	87,256,495	134,815,524	129,522,432	203,566,778	195,209,213
Post Remedial Action O&M	$11,423,228	15,708,895	15,708,895	15,467,245	15,467,245	15,029,092	15,029,092
Total 30 Year Cost	11,423,228	106,279,762	102,965,390	150,282,769	144,989,677	218,595,871	210,238,306

*Impacted Insitu Volume

APPENDIX E

RESPONSIVENESS SUMMARY

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1. INTRODUCTION

An Engineering Evaluation/Cost Analysis (EE/CA) was prepared to analyze alternatives for managing radioactively contaminated material at the St. Louis Airport Site (SLAPS). The EE/CA was issued for public review and comment on March 5, 1998. The public comment period extended from March 6, 1998 through April 9, 1998. Nine comment letters were received on the proposed action. This Responsiveness Summary addresses the significant comments received from the public during the comment period.

The public and other stakeholders expressed a strong preference for Alternative 2C. Therefore, USACE has modified the Draft EE/CA dated March 1998 to recommend Alternative 2C as the preferred alternative. As the preferred action, Alternative 2C is intended to support the removal of radioactively contaminated fill materials. Material will be removed to meet radionuclide concentrations for radium and thorium in soil of 5 picoCuries per gram (pCi/g) above background in the top 15 cm of soil and 15 pCi/g above background in any subsequent 15 cm layer. A corresponding concentration for U-238 will be 50 pCi/g above background. Based on the EE/CA and the comments received, the recommended alternative is considered appropriate and will be implemented in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (as amended) and the National Environmental Policy Act.

2. SCOPE AND ORGANIZATION OF THE RESPONSIVENESS SUMMARY

Nine letters were received during the comment period; which included three from local officials, one from a regulatory agency, one from a local utility, one from a local corporation, one from a law firm, and two from private citizens. Due to the number of comments received, key questions are addressed individually below.

USACE encourages those interested in learning more about the St. Louis Site to review the Administrative Record (which contains reports and other information collected about the site) to ask questions or to be added to the mailing list for future mailings about the site. The Administrative Record is available for review at the following locations:

Public Information Center
9170 Latty Avenue
Berkeley, Missouri 63134

St. Louis Public Library / Main Library
Government Information Section
1301 Olive Street
St. Louis, Missouri 63103

St. Louis County Library
Prairie Commons Branch
915 Utz Lane
Hazelwood, Missouri 63042

3. COMMENTS AND RESPONSES

A list of individuals and organizations that submitted comments is provided in Table 1 Each key question is re-stated in Table 2 adjacent to USACE's response. The questions in Table 2 are numbered sequentially and do not reflect any numbering that was used in the comment letters General statements are not listed in Table 2 but may be found in Appendix E-1. Appendix E-1 contains the complete text of the submitted comments. A transcript of the public meeting is contained in Appendix E-2.

The submitted comments have been placed in the Administrative Record file for the site. This final EE/CA has also been placed in the Administrative Record file.

Table 1. Individuals and Organizations that Submitted Comments on the SLAPS EE/CA

Name	Organization Affiliation
Jim Talent	Congressman State of Missouri
Mel Carnahan	Governor State of Missouri
Steve Mahfood	Director, Missouri Department of Natural Resources
Robert F. Borland, PE	Mallinckrodt
Donovan Larson	County Water
Shannon D. Work	Givens, Funke & Work
David W. Farquharson,	Mayor City of Hazelwood
Sandy Delcoure	
Michael V. Garvey	

Comment Number	Comment	Response
	Jim Talent, Congressman State of Missouri	
1	I am, hereby, submitting public comments in support of Alternative 2C in the SLAPS EE/CA. Alternative 2C provides for the excavation and removal of contaminated materials from SLAPS as well as the ballfields, and the use of clean soils as backfill for these properties. In addition, alternative 2C will remediate these sites up to the 5/15/50 (pCi/g) or residential use cleanup criteria.	The USACE considered the information provided and has revised the EE/CA to show Alternative 2C as the preferred alternative.
	Mel Carnahan, Governor State of Missouri	
2	I must join those witnesses at the March 17 public hearing who expressed concern over the Corps' proposal to use contaminated material for backfilling. The stockpiling of this material is opposed by area citizens and their elected officials.	The USACE considered the information provided and has revised the EE/CA to show Alternative 2C as the preferred alternative.
	Steve Mahfood, Director Missouri Department of Natural Resources	
3	However, the use of contaminated materials between 5 picocuries per gram and 15 picocuries per gram for backfilling poses several very significant problems that cannot be justified by the very minor projected four percent cost savings.	The USACE considered the information provided and has revised the EE/CA to show Alternative 2C as the preferred alternative.
4	An issue of significant concern in the EE/CAs is the decision to portray future industrial use of these sites as a "worst case scenario" for analysis.	The industrial use scenario is consistent with the anticipated use of the site. As required by the CERCLA process, a full range of alternatives will be considered in the feasibility study. The North County feasibility study is anticipated to occur during FY98 and FY99.
5	Also, the possibility of obtaining drinking water from the aquifer beneath the sites should be a factor in worst case risk calculations because the aquifer is currently being used for domestic water supply in St. Louis County.	Groundwater is not within the scope of this EE/CA. Groundwater will be addressed in the North County Feasibility Study and the Record of Decision.
6	The issue of Actinium and Protactinium also needs to be addressed in the risk assessment.	Additional data is currently being collected and information obtained will be incorporated into the final FS/ROD.
7	All future sampling events should include analysis for Ac-227 and Pa-231.	This is currently being done.
8	In addition to radionuclides, chemical contaminants are also of concern at these FUSRAP sites. The Corps must develop plans to remediate these FUSRAP sites to safe levels for both radionuclides and chemical contaminants, such as solvents and metal that were associated with MED/AEC activities. All contaminant of concern should be considered in the risk scenarios.	The results of further characterization work scheduled to occur during the spring and summer of 1998 will help with the identification of non-radiological contaminants of concern. These results will be used in the development of the North County Feasibility Study and the Record of Decision.

Comment Number	Comment	Response
9	Water management needs to be addressed in more detail in the EE/CAs.	The engineering details associated with water management will be included as a part of the construction plans and specifications.
10	We recommend that more information on the plans for protection of workers, public, and the environment during the implementation phase of the cleanup should be included in the EE/CAs. Radon is not discussed at all in any of the documents or how it will be handled if encountered.	Detailed health and safety information will be included in the Health and Safety Plan.
11	Background levels for radionuclides have been tentatively established, but background levels for groundwater quality have not been addressed in any of the environmental documents.	Groundwater is not within the scope of this EE/CA. Groundwater will be addressed in the North County Feasibility study and the record of decision. The results of further characterization work scheduled to occur during the spring and summer of 1998 will further develop the background concentrations of both radiological and non-radiological contaminants of concern.
	Robert F. Borland, PE Mallinckrodt	
12	Page ES-1 line 8. This sentence implies that separate processes were performed to extract radium from ore. Mallinckrodt does not believe this to be the case, the process objective was extraction of uranium from ores and concentrates. The generation of residues preferentially containing radium, if any, was likely an artifact of the uranium purification process, not a process objective.	Text revised
13	Page 5-4, line 5. It is unclear whether expenditures by property owners and USACE associated with excavation, management, and disposal of contaminated soils in the future was included in the cost analysis. Such costs will be incurred during the construction, maintenance, and expansion of any facility constructed on the site.	Based on the 15/15/50 cleanup criteria selected for implementation after public comment, the property can be released for use without radiological restrictions regardless of future land use.
14	Page C-4, line 4. It is unclear whether industrial worker exposures during excavation for maintenance and future construction and development of the property have been addressed. Such activities will be performed to support the maintenance and expansion of any facility constructed on the site.	This scenario will be evaluated as a part of the North County Feasibility Study.
15	Table C-4. The clean up level stated for alternatives 2C and 3C is 50/100/150. This is inconsistent with page C-1, line 24 which indicates that the subsurface cleanup criteria for "C" alternatives is 15/15/50.	Text revised

Comment Number	Comment	Response
	Donovan Larson **County Water**	
16	A further comment, however, needs to be made regarding the desire to reduce the amount of material hauled off-site by measuring and retaining that material that measures below the 15/15/50 pCi/g parameters. The level of accuracy as well as the expense represented by such a procedure seems to be a poor alternative to the removal of all material to an off-site storage location. It is therefore our position that you should not rely on such sampling to guide your field people in determining which materials should be left on-site versus what should be removed to out-of-state storage. Instead your proposed procedures should simply result in all excavated materials being removed to an off-site, out-of-state permanent storage facility.	The USACE considered the information provided and has revised the EE/CA to show Alternative 2C as the preferred alternative.
	Shannon D. Work **Givens, Funke & Work**	
17	If disposal of 11.e(2) by-product material from SLAPS or HISS at Dawn's site next to the Spokane Reservation is even a remote possibility, these principles [for federal actions affecting Indian tribes and tribal trust resources] have not been realized. If such materials might be removed from the SLAPS or HISS, the EE/CA documents are deficient because they do not discuss impacts specific to disposal at facilities licensed to receive such materials, particularly where tribes and their resources might be negatively impacted.	The EE/CA evaluated alternatives for responding to the SLAPS, including transport of contaminated materials to an off-site facility. The disposal facility will be determined in accordance with all applicable laws and regulations, including federal procurement laws and the EPA regulations on federal use of off-site disposal facilities stated in the NCP, 40 CFR 300.440. The facility will be selected during the implementation of the removal action.
18	The Tribe questions whether the SLAPS and HISS EE/CA alternatives contemplating off-site disposal can be found to be protective of human health and welfare and the environment when the potential impacts at the disposal end of the proposal are not even considered.	
19	It is imperative that the Tribe be consulted with concerning any possible federal action which might threaten its Reservation, and that such consultation be conducted sufficiently early in the process that it will have a meaningful effect on the outcome.	
20	When disposal of federal waste is considered for a state-licensed site like Dawn's it is incumbent upon the responsible federal agency as trustee to ensure no injury to affected tribes and their resources.	

Comment Number	Comment	Response
21	What are the impacts the DMC site and additional FUSRAP waste will have on Reservation resources? Will the quality or quantity of these waters be impacted in any way by the proposed alternative? What impacts will result to Reservation fish and wildlife? To cultural resources? What are the likely human health impacts if the FUSRAP waste in Dawn's impoundment contaminates the deep aquifer? What will be required as mitigation should this occur? Shouldn't the condition and integrity of the specific disposal cell at the facility be taken into account in order to complete this analysis? Have there been irreversible and irretrievable commitments of Tribal resources? How would a Tribal natural resource damage action under CERCLA for harm to Reservation resources affect the cost analyses contained in the SLAPS and HISS EE/CA documents? Does the federal government's trust responsibility over Tribal trust resources permit the disposal of FUSRAP materials at Dawn's site?	
	David W. Farquharson, Mayor City of Hazelwood	
22	The Hazelwood City Council supports the second alternative, which includes the use of minimal quantities of soil below selected criteria.	The preferred alternative has been changed to Alternative 2C.
	Michael V. Garvey	
23	My chief concern has always been the geologic unsuitability of Weldon Spring, Mo. Should it be considered as an "off-site" location for long term disposal. I now notice a disturbing change in wording from "out of state" to "off site". The additional weight in this area of karst topography may well result in catastrophic collapse. This would resulting in rapid ground water migration of the mixed wastes in the solution channels of limestone bedrock immediately underlying the site. This is especially of concern due to the location of the new Madrid fault and the likelihood of a rather large quake in the foreseeable future.	The USACE has no current plans to use the Weldon Spring disposal facility.
	Public Meeting	
24	Many comments were received at the public meeting in support of Alternative 2C. See Appendix C for a transcript of the public meeting.	The preferred alternative has been changed to Alternative 2C.

APPENDIX E-1: PUBLIC COMMENTS

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April 7, 1998

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http://www.house.gov/talent/

Dr. R. L. Mullins, Jr. PE, AICP
FUSRAP Project Manager
U.S. Army Corps Of Engineers
9170 Latty Avenue
Berkeley, Missouri 63134

Dear Dr. Mullins:

I am writing to you with regard to the Engineering Evaluation/Cost Analysis(EE/CA) for the removal of radioactive material from the St. Louis Airport Site(SLAPS)and the ballfields properties under the Formerly Utilized Sites Remedial Action Program(FUSRAP) now being administered by the U.S. Army Corps of Engineers.

The primary purpose of the proposed action is to restrict the release of contaminated materials from SLAPS thereby minimizing the potential for associated impacts to human health and the environment. Specifically, it is desired to eliminate the potential for migration of contaminated materials from these properties to off-site soils, surface water, groundwater or air. A secondary objective of this action is to restore these properties to beneficial use.

In light of these objectives, I am, hereby, submitting public comments in support of Alternative 2C in the SLAPS EE/CA. Alternative 2C provides for the excavation and removal of contaminated materials from SLAPS as well as the ballfields, and the use of clean soils as backfill for these properties. In addition, alternative 2C will remediate these sites up to the 5/15/50(pCi/g) or residential use cleanup criteria.

I am supporting Alternative 2C instead of the preferred alternative of the Corps Of Engineers(Alternative 3C), which provides for the excavation and removal of soils at or above the selected cleanup criteria, and the use of below criteria or low level contaminated soils as backfill for these properties. While I greatly admire the Army Corps' desire to provide the most cost effective remedy for these properties, I feel that Alternative 2C will be more cost effective in the long run as the local governments try to convert these properties back to beneficial use. Alternative 2C is also the preferred remedy of the impacted local government entities such as the State of Missouri, St. Louis County and the City of Hazelwood, Missouri.

In closing, I would like to congratulate the St. Louis District Corps of Engineers for their commitment to cleaning up these contaminated sites in the St. Louis Area. In less than a year since the Corps took over the cleanup responsibilities for all FUSRAP Sites, significant progress

has been made in formulating a thorough and acceptable final remedy for the St. Louis FUSRAP Sites.

Sincerely,

Jim Talent
Member of Congress

JT/th

OFFICE OF THE GOVERNOR
STATE OF MISSOURI
JEFFERSON CITY
(573) 751-3222

MEL CARNAHAN
GOVERNOR

ROOM 216
STATE CAPITOL
65101

April 6, 1998

General Joe N. Ballard
Chief of Engineers
U.S. Army Corps of Engineers
Pentagon
Washington, DC

SUBJECT: Public Hearing before the U.S. Army Corps of Engineers, March 17, 1998, Cleanup Proposals for the St. Louis Airport Site and Hazelwood Interim Storage Site

Dear General Ballard:

Please find attached my letter to Colonel Hodgini, St. Louis District, USACE, regarding the above referenced public hearing.

I commend the USACE's start-up efforts to initiate a timely and successful cleanup program for the federal nuclear weapons production waste sites in St. Louis City and County.

A broad consensus has developed among state and local officials in support of proposed cleanup criteria and alternatives for both St. Louis sites. It is the result of several years of public input, technical analysis and inter-agency work to address the concerns and interests of all affected parties.

I am confident the Corps will develop cleanup plans in concert with the recommendations presented at the recent public hearing, which represent the overall interests of the State of Missouri.

Thank you for your attention to this important issue.

Very truly yours,

Mel Carnahan

Mel Carnahan

MC:RC:sbs

Attachment

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STATE OF MISSOURI
JEFFERSON CITY
(573) 751-3222

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65101

April 6, 1998

Colonel Thomas J. Hodgini
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103

SUBJECT: Public Hearing before the U.S. Army Corps of Engineers, March 17, 1998

Dear Colonel Hodgini:

I commend the Corps of Engineers for its initial efforts related to the cleanup of federal nuclear weapons production waste sites in St. Louis City and County. I have worked closely with the Clinton Administration for several years on this issue and I look forward to working with you to achieve a complete and timely cleanup of these sites.

There is significant public support for the cleanup of the St. Louis federal nuclear weapons production waste sites. Elected officials from the St. Louis Metropolitan area and members of the Missouri Congressional Delegation continue to support a full and complete cleanup consistent with the recommendations of the St. Louis Sites Remediation Task Force.

As is evident from the March 17, 1998, public hearing on cleanup plans for the St. Louis Airport and Hazelwood sites, there continues to be not only significant public support but also a broad consensus on the technical criteria for how cleanup efforts should be conducted. Testimony from St. Louis City, St. Louis County, and the chairmen of the St. Louis Oversight Committee and the St. Louis Sites Remediation Task Force all supported proceeding with the cleanups but with the use of clean, uncontaminated fill.

I must join with those witnesses at the March 17 public hearing who expressed concern over the Corps' proposal to use contaminated material for backfilling. The stockpiling of this contaminated material is opposed by area citizens and their elected officials. As you may know, almost all of the owners of the affected sites had no role in the contamination of their property and deserve to be made whole through a full and complete cleanup.

My office will steadfastly support the FUSRAP cleanup activities of the St. Louis District Corps of Engineers so long as area stakeholders agree with the Corps' plans and the plans are technically sound. In the case of the Airport and Hazelwood cleanups, an adjustment of the plans to reflect community opinion is in order.

I look forward to maintaining close communication with the St. Louis District as the cleanup projects progress. Please include this letter as a part of the formal record of comment.

Very truly yours,

Mel Carnahan

c: Senator John Ashcroft
Senator Christopher S. Bond
Congressman William L. Clay
Congressman Richard A. Gephardt
Congressman James M. Talent
Lieutenant General Joe N. Ballard

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April 6, 1998

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Chief of Engineers
U.S. Army Corps of Engineers
Pentagon
Washington, DC

SUBJECT: Public Hearing before the U.S. Army Corps of Engineers, March 17, 1998. Cleanup Proposals for the St. Louis Airport Site and Hazelwood Interim Storage Site

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I am confident the Corps will develop cleanup plans in concert with the recommendations presented at the recent public hearing, which represent the overall interests of the State of Missouri.

Thank you for your attention to this important issue.

Very truly yours,

Mel Carnahan

Mel Carnahan

MC:RC:sbs

Attachment

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April 6, 1998

Colonel Thomas J. Hodgini
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, MO 63103

SUBJECT: Public Hearing before the U.S. Army Corps of Engineers, March 17, 1998

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I look forward to maintaining close communication with the St. Louis District as the cleanup projects progress. Please include this letter as a part of the formal record of comment.

Very truly yours,

Mel Carnahan

c: Senator John Ashcroft
Senator Christopher S. Bond
Congressman William L. Clay
Congressman Richard A. Gephardt
Congressman James M. Talent
Lieutenant General Joe N. Ballard

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
OFFICE OF THE DIRECTOR
P.O. Box 176 Jefferson City, MO 65102-0176

April 6, 1998

Dr. Rob Mullins, Jr.
Project Manager
U.S. Army Corps of Engineers
FUSRAP Office
9170 Latty Avenue
Berkeley, MO 63134

Dear Dr. Mullins:

The U.S. Army Corps of Engineers has submitted for agency review Engineering Evaluation/Cost Analysis reports (EE/CAs) for the St. Louis Airport Site (SLAPS) and Hazelwood Interim Storage Site (HISS). I am pleased to provide the following comments on behalf of the Missouri Department of Natural Resources. I also have appended my testimony presented at the March 17th public hearing which should be added to the formal record.

The department commends the Corps of Engineers' commitment to remedy the adverse environmental situation currently existing in the St. Louis area due to the Manhattan Engineering District/Atomic Energy Commission (MED/AEC) activities. The proposed actions are the continuation of the long-awaited remedial action at the St. Louis Formerly Utilized Sites Remedial Action Project (FUSRAP) sites.

The Corps has made the correct decision in the selection of the 5/15 cleanup criteria. That is the proper technical cleanup criteria and it is in agreement with the wishes of area citizens. However, the use of contaminated material between 5 picocuries per gram and 15 picocuries per gram for backfilling poses several very significant problems that cannot be justified by the very minor projected four percent cost savings. If the Corps will agree to utilize clean fill for backfilling, then there will exist broad agreement between citizens and their government regarding the proposed cleanup. As stated in my testimony presented at the public hearing held in St. Louis on March 17, 1998, the Department of Natural Resources supports Alternative 2C for SLAPS and Alternative 3 for HISS and its associated vicinity properties.

An issue of significant concern in the EE/CAs is the decision to portray future industrial use of these sites as a "worst case scenario" for analysis. A more realistic "worst case scenario" is future residential use since residential developments presently exist adjacent to the sites. Also, the possibility of obtaining drinking water from the aquifer beneath the sites should be a factor in worst case risk calculations because the aquifer is currently being used for domestic water supply in St. Louis County.

In addition to the groundwater consumption pathway, the issue of Actinium and Protactinium also needs to be addressed in the risk assessment. The lack of accurate data for these radionuclides remains a matter of concern. All future sampling events should include analysis for Ac-227 and Pa-231.

In addition to radionuclides, chemical contaminants are also of concern at these FUSRAP sites. The Corps must develop plans to remediate these FUSRAP sites to safe levels for both radionuclides and chemical contaminants, such as solvents and metals that were associated with MED/AEC activities. All contaminants of concern should be considered in the risk scenarios. It is known that 600 ppb TCE has been detected in at least one monitoring well.

Water management needs to be addressed in more detail in the EE/CAs. Water management during remediation should address the issues of infiltration to groundwater, surface water runoff, and potential flooding issues. Great care must be exercised so that contamination is not inadvertently spread.

We recommend that more information on the plans for protection of workers, public, and the environment during the implementation phase of the cleanup should be included in the EE/CAs. Radon is not discussed at all in any of the documents or how it will be handled if encountered.

Groundwater at both SLAPS and HISS is an important issue and will need to be addressed in the final Record of Decision. However, the source removal action described in the EE/CAs should not be delayed while it is resolved. The establishment of background levels is a key step in any remediation project. Background levels for radionuclides have been tentatively established, but background levels for groundwater quality have not been addressed in any of the environmental documents.

This anticipated cleanup is long overdue. The Corps of Engineers is to be commended for proceeding expeditiously with the cleanup project assigned to it by the Congress.

I appreciate this opportunity to comment on this very important action proposed for the St. Louis area.

Sincerely,

DEPARTMENT OF NATURAL RESOURCES

Steve Mahfood
Director

SM:jm

c: Senator John Ashcroft
Senator Christopher S. Bond
Congressman William L. Clay
Congressman Richard A. Gephardt
Congressman James M. Talent
Governor Mel Carnahan
Dennis Grams, Regional Administrator, U.S. EPA Region VII
Maureen Dempsey, Director, Missouri Department of Health
Ric Cavanaugh, St. Louis Oversight Committee

TESTIMONY

Stephen Mahfood
Director
Missouri Department of Natural Resources

before the
Corps of Engineers
Public Hearing
on the

Draft Engineering Evaluation/Cost Analysis (EE/CA)
for the
St. Louis Airport Site (SLAPS)
and
Hazelwood Interim Storage Site (HISS)

Tuesday, March 17, 1998

Good Evening. My name is Stephen Mahfood. I serve Governor Mel Carnahan as the Director of the Missouri Department of Natural Resources. The Missouri Department of Natural Resources is the environmental quality and resource protection agency for Missouri state government.

Tonight I am here to present formal testimony on behalf of the State of Missouri regarding the Corps of Engineers' cleanup proposals for the St. Louis Airport Site, the Hazelwood Interim Storage Site and associated vicinity properties.

As you know, uranium was refined in St. Louis from 1942 to 1957 for the nation's nuclear weapons program. Radioactive waste resulting from those federal weapons production activities now contaminates properties in St. Louis City and St. Louis County. Governor Carnahan has strongly urged the responsible federal agencies to move forward with the cleanup of nuclear weapons production wastes and to do this in a manner that leaves property owners whole. This anticipated cleanup is long overdue. The Corps of Engineers is to be commended for proceeding expeditiously with the cleanup project assigned to them by the Congress.

I believe the Corps of Engineers may be on the verge of initiating a successful cleanup that would be consistent with the recommendations of the St. Louis Site Remediation Task Force. The Corps has made the correct decision in the selection of the 5/15 cleanup criteria. That is the proper technical cleanup criteria and it is in agreement with the wishes of area citizens.

The State of Missouri supports Alternative 2C for the St. Louis Airport Site and vicinity properties. Following the same principle, the State of Missouri supports Alternative 3 for the Hazelwood Interim Storage Site and its associated vicinity properties. In the case of the St. Louis Airport Site and the Hazelwood Interim Storage Site, the use of contaminated material between 5 picocuries per gram and 15 picocuries per gram for backfilling poses several significant problems that cannot be justified by the very minor projected 4 percent cost savings.

The Corps of Engineers' proposal to use below criteria but nonetheless contaminated material instead of clean fill would have the following impacts:

1) it would make the cleanup more complicated;

2) it would require the segregation of waste during excavation;

3) it would require the stockpiling of contaminated materials for an undetermined time;

4) it would require that stockpiled waste be protected from wind and water erosion for lengthy periods;

5) it would require much more extensive sampling and analysis;

6) it would violate the Missouri Solid Waste Law.

I sincerely hope that the Corps of Engineers will reconsider its position with respect to the use of below criteria material for backfill. If the Corps would decide to use clean fill for backfilling, then there will exist broad agreement between citizens and their government regarding the proposed cleanup.

Thank you for the opportunity to comment.

MALLINCKRODT

Improving Healthcare and Chemistry

Mallinckrodt Inc.
16305 Swingley Ridge Drive
Chesterfield MO 63017
Phone: 314.654.2000

April 6, 1998

Dr. R.L. Mullins, Jr., PE, AICP
U.S. Army Corps of Engineers
St. Louis District
9170 Latty Avenue
Berkeley, MO 63134

Subject: Comments on the Engineering Evaluation/Cost Analysis (EE/CA) for the St. Louis Airport Site (SLAPS)

Dear Dr. Mullins:

Mallinckrodt submits the following comments on the subject EE/CA.

Page ES-1, line 8. This sentence implies that separate processes were performed to extract radium from ore. Mallinckrodt does not believe this to be the case; the process objective was extraction of uranium from ores and concentrates. The generation of residues preferentially containing radium, if any, was likely an artifact of the uranium purification process, not a process objective.

Page 5-4, line 5. It is unclear whether expenditures by property owners and USACE associated with excavation, management, and disposal of contaminated soils in the future was included in the cost analysis. Such costs will be incurred during the construction, maintenance, and expansion of any facility constructed on the site.

Page C-4, line 4. It is unclear whether industrial worker exposures during excavations for maintenance and future construction and development of the property have been addressed. Such activities will be performed to support the maintenance and expansion of any facility constructed on the site.

Page C-12, Table C-4. The cleanup level stated for alternatives C2 and C3 is 50/100/150. This is inconsistent with page C-1, line 24 which indicates that the subsurface cleanup criteria for "C" alternatives is 15/15/50.

Please contact me at 314-654-6170 if you have any questions or require additional information.

Sincerely,

Robert F. Boland, PE
Environmentaal Program Manager

County Water

ST. LOUIS COUNTY WATER CO. • 535 N New Ballas Rd • Saint Louis MO 63141-6875 (314) 99
FAX 56

April 6, 1998

Dr. Rob Mullins, P.E., AICP
St. Louis District, Army Corps of Engineers
FUSRAP Project Office
9170 Latty Avenue
Berkeley, MO 63134

RE: Comments on the Hazelwood Interim Storage Site EE/CA Document (March 1998), and Comments on the St. Louis Airport Site EE/CA Document (March 1998)

Dear Dr. Mullins:

St. Louis County Water Company would like to make the following statements regarding the above noted public documents. We are in agreement with your noted recommendation and we support the Corps of Engineers' decision to clean the above noted sites to the 5 and 15 pCi/g standard. We believe that such level of cleanup is in the interest of the St. Louis community and, certainly in the interest of the field workers who would be under the employ of St. Louis County Water Company and might find themselves working in sites adjacent to the HISS and SLAPS areas. It is gratifying to see that the Corps of Engineers is completing the cleanup work as a final chapter to the work begun by your organization' s Manhattan Engineering District in the 1940's.

A further comment, however, needs to be made regarding your desire to reduce the amount of material hauled off-site by measuring and retaining that material that measures below the 15/15/50 pCi/g perameters. Your plan would have that material used as permanent backfill at SLAPS. This Company's concern stems from its experience with the measurement efforts that the Department of Energy, and later the Corps of Engineers had to undertake to provide this company with soil analyses which indicated what soils were safe for contact with our field workers in recent water main break events. It was our experience that multiple days were required to get a true reading of the alpha radiation levels of the soil samples which your staff removed and analyzed from our water main break sites. It was clear that the measurement was time consuming and we can only expect, was expensive. In discussions with your staff regarding the accuracy of such samples, it became clear that although the sampling was assumed to be representative of the larger quantity of material in question, that to actually measure enough soil samples to be certain that all of the soil encountered was indeed safe, many more samples would have had to have been taken and analyzed. In the soil sampling proposed, I must believe that the same limitations will apply. Due to time and dollar constraints, you will have to make generalizations regarding soil contamination levels, and these assumptions will not always be right.

The level of accuracy as well as the expense represented by such a procedure seems to be a poor alternative to the removal of all material to an off-site storage location. It is therefore our position that you should not rely on such sampling to guide your field people in determining which materials should to be left on-site versus what should be removed to out-of-state storage. Instead your proposed procedures should simply result in all excavated materials being removed to an off-site, out-of-state permanent storage facility.

I appreciate the time that you have taken in review these comments and look forward to a successful, final resolution of the Corps of Engineers clean-up effort

Sincerely,

Donovan Larson
Manager, System Engineering

DL:mls

GIVENS, FUNKE & WORK
ATTORNEYS AT LAW
TOP FLOOR - OLD CITY HALL
424 SHERMAN AVE. P.O. BOX 969
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(208) 667-5486
FAX (208) 667-4695

April 3, 1998

Dr. R.L. Mullins, Jr., PE, AICP
U.S. Army Corps of Engineers
St. Louis District
9170 Latty Avenue
Berkeley, MO 63134

Re: St. Louis Airport Site EE/CA (FUSRAP)
Hazelwood Interim Storage Site EE/CA (FUSRAP)

Dear Dr. Mullins:

I am Special Legal Counsel to the Spokane Tribe of Indians on various natural resource matters. One of the matters on which I work for the Tribe concerns an inactive uranium millsite located just off the Spokane Indian Reservation, but immediately adjacent to it and to an important Reservation waterway known as Chamokane Creek. Operated for decades by Dawn Mining Company, the millsite is known to contaminate both surface and ground waters, including waters to which the Tribe holds federally protected and adjudicated rights. See *United States v. Anderson*, 736 F.2d 1358 (9th Cir. 1984). Under its off-reservation authority, the State of Washington in February 1995 licensed Dawn to convert a vast open impoundment at the site into a disposal cell for Atomic Energy Act 11.e(2) byproduct material. These comments are submitted on behalf of the Spokane Tribe regarding the USACE's engineering evaluation/cost analysis (EE/CA) documents prepared in support of proposed actions to remove radioactively contaminated soils from the St. Louis Airport Site (SLAPS), the Hazelwood Interim Storage Site (HISS), and related areas. Although neither the SLAPS nor the HISS EE/CAs describe the presence of 11.e(2) byproduct material, discussing instead low-level waste, these comments are nonetheless submitted to raise issues of specific impacts to the Spokane Indian Reservation anticipated to be caused by alternatives which require offsite disposal, in the event removal of 11.e(2) byproduct material from those sites is contemplated.

INTRODUCTION

An Executive Memorandum issued by President Clinton on April 29, 1994 implements four key guiding principles for federal actions affecting Indian tribes and tribal trust resources:

> 1) federal departments and agencies are to "operate[] within a government-to-government relationship with federally recognized tribal governments,"
>
> 2) federal departments and agencies "shall consult . . . with tribal governments prior to taking actions that affect federally recognized tribal governments,"
>
> 3) federal departments and agencies "shall assess the impact of Federal Government plans, projects, programs, and activities on tribal trust resources and assure that tribal government rights and concerns are considered during the development of such plans, projects, programs, and activities," and
>
> 4) federal departments and agencies "shall take appropriate steps to remove any procedural impediments to working directly and effectively with tribal governments on activities that affect the trust property and/or governmental rights of the tribes."

Presidential Memorandum, 59 Fed. Reg. 22951 (1994), *reprinted in* 25 USCA § 450 note. If disposal of 11.e(2) byproduct material from SLAPS or HISS at Dawn's site next to the Spokane Reservation is even a remote possibility, these principles have not been realized.

If such materials might be removed from the SLAPS or HISS, the EE/CA documents are deficient because they do not discuss impacts specific to disposal at facilities licensed to receive such materials, particularly where tribes and their resources might be negatively impacted. At present, there are only three facilities in the United States licensed to receive 11.e(2) material for disposal: one was licensed in New Mexico last year by the Nuclear Regulatory Commission, another is located in Utah, and the third is Dawn's facility next to the Spokane Indian Reservation. To the Tribe's knowledge, the licenses at the Utah and New Mexico facilities are presently not under legal challenges, but Dawn's license is. Conceivably, however, administration of federal procurement and contracting laws may lead to an agreement by USACE to dispose 11.e(2) material at the Dawn facility despite the questionable legal status of the license.

RISK TO TRIBAL TRUST RESOURCES AND HUMAN HEALTH

The Tribe questions whether the SLAPS and HISS EE/CA alternatives contemplating off-site disposal can be found to be protective of human health and welfare and the environment when the potential impacts at the disposal end of the proposal are not even considered. The Tribe is heavily dependent on the ground and surface waters of the Chamokane Creek Basin. See *United States v. Anderson*. In addition to supporting Reservation fish and wildlife, uses of this basin's waters include domestic, ranching, farming, and a Tribal fish hatchery. At present, the Dawn site is known to contaminate Chamokane Creek's surface water and an upper aquifer at the site. Tribal technical staff have determined it likely that the site also contaminates a deep aquifer from which drinking water is drawn. Further, the High Density Polyethylene liner in Dawn's disposal cell is only 30 mil, and is over 16 years old. The manufacturer's warranty for the liner expired more than one year ago. Similar concerns regarding this disposal cell's integrity have been raised by Department of Energy technical staff who should be consulted by USACE before determining to send any FUSRAP waste to eastern Washington. Beyond this, it is imperative that the Tribe be consulted with concerning any possible federal action which might threaten its Reservation, and that such consultation be conducted sufficiently early in the process that it will have a meaningful effect on the outcome. See *U.S. Army Corps of Engineers Tribal Policy Principles* (identifying as key principles Tribal Sovereignty, Trust Responsibility, Government to Government Relations, Pre-Decisional and Honest Consultation, Self-Reliance, and Natural and Cultural Resources).

In evaluating impacts related to the proposed removals, the EE/CA documents, in typical fashion, focus on the subject SLAPS and HISS sites. As stated in both, "[t]he effectiveness of an alternative is defined by its ability to protect human health and the environment from risks associated with the radioactive materials in both the short term and the long term." (Section 5.1). Both then proceed to determine that the proposed removals satisfy this requirement. As discussed above, however, these conclusions when applied to Dawn's facility are highly suspect from a technical standpoint. Moreover, from a federal Indian policy standpoint, they are wholly unsupported since no effort has been made by USACE to "assess the impact of Federal Government plans, projects, programs, and activities on tribal trust resources and assure that tribal government rights and concerns are considered during the development of such plans, projects, programs and activities." See Presidential Memorandum dated April 29, 1994. See also, Civil Rights Act of 1964, Title VI (42 USCA 2000d, et seq.) and related regulations. The reason the principles in the Presidential Memorandum exist is the federal trust responsibility to tribes and their resources, developed

through more than 150 years of jurisprudence. States have no such responsibility, and indeed throughout history have routinely taken strongly adverse positions to tribes as sovereigns. In fact, this responsibility can be neither delegated to states nor abdicated by the federal government. *Assiniboine and Sioux Tribes v. Bd. of Oil and Gas*, 792 F.2d 782 (9th Cir. 1986). Thus, when disposal of federal waste is considered for a state-licensed site like Dawn's it is incumbent upon the responsible federal agency as trustee to ensure no injury to affected tribes and their resources. While offsite disposal impacts are often not considered in environmental reviews for reclamation, they must be where federal trust duties have not been addressed in the process of licensing the disposal facility. And this must be accomplished before the federal action has proceeded down a path where federal procurement and contracting laws render it irreversible.

If Dawn's facility is a potential disposal site, the Spokane Tribe's "rights and concerns" must yet be considered. In the context of trust resources, those "rights and concerns" include the following. What are the impacts the DMC site and the additional FUSRAP waste will have on Reservation resources? Will the quality or quantity of these waters be impacted in any way by the proposed alternative? What impacts will result to Reservation fish and wildlife? To cultural resources? What are the likely human health impacts if the FUSRAP waste in Dawn's impoundment contaminates the deep aquifer? What will be required as mitigation should this occur? Shouldn't the condition and integrity of the specific disposal cell at the facility be taken into account in order to complete this analysis? Have there been irreversible and irretrievable commitments of Tribal resources? How would a Tribal natural resource damage action under CERCLA for harm to Reservation resources affect the cost analyses contained in the SLAPS and HISS EE/CA documents? Does the federal government's trust responsibility over Tribal trust resources permit the disposal of FUSRAP materials at Dawn's site? These questions must be answered and a more meaningful opportunity for Tribal consultation presented before USACE commits to a course which may lead to further injury of Tribal trust resources.

TRAFFIC SAFETY RISKS TO TRIBE

The route selected by Dawn to transport its waste includes a narrow, winding and hilly highway which serves as the primary route for Tribal members and employees travelling to and from the Spokane Indian Reservation. The Tribe presently is contesting selection of this route, and has submitted to the State of Washington the enclosed document entitled "Traffic Safety Study, State Route 231, Reardan to Ford, Dawn Mining Mill Site Closure Proposal," which are formal comments prepared by a Tribal traffic safety consultant on a State conducted

study, and which are to be considered as additional Tribal comments regarding the proposed actions at SLAPS and HISS.

In general, the issues of trust responsibility raised in the above section concerning threats to human health and natural resources apply equally to the traffic threats Dawn's plan poses to Tribal membership. Although traffic impacts are considered in the EE/CA documents, the guiding principles of the 1994 Executive Memorandum are not satisfied. The Tribe must be consulted with on a government-to-government basis and impacts to the Tribe must be assessed prior to implementation of the plan.

In assessing these impacts, the following must be considered. According to Washington data, nearly one-half of the accidents studied along Dawn's route result in death or injury. Dawn's proposal will increase large truck traffic on State Route 231 by 400% to 600%. Large trucks, during the period in which the State's studies provide such statistics, represented nearly one-sixth of the accidents in this corridor. A particularly winding stretch of this route is in a canyon adjacent to a stream which flows onto the Spokane reservation, and represents an area in which nearly one-fourth of the accidents studied along Dawn's preferred route occurred. Spills of radioactive waste from accidents in either this canyon or at a dangerous bridge which crosses the Spokane River will result in contamination of critical Tribal waters and other resources. Beyond an assessment of these issues, the Tribe, consistent with the Presidential Memorandum and the United States' trust responsibility, is entitled to consultation.

THE PROPOSED ACTIONS AT SLAPS AND HISS RAISE ISSUES OF ENVIRONMENTAL JUSTICE

The need to examine the disposal end of the proposed actions at SLAPS and HISS is important, not just to satisfy the guiding principles of the 1994 Presidential Memorandum, but also to satisfy the mandate of Executive Order 12898, dated February 11, 1994 (59 Fed. Reg. 7629 (1994), 60 Fed. Reg. 6381 (1995), *reprinted in* 42 USCA § 4321 note) and Title VI of the 1964 Civil Rights Act. The executive order requires agencies of the executive department to act consistent with the principle of environmental justice and the Civil Rights Act bars discrimination in federal programs and activities affecting human health and the environment. In other words, federal agencies must consider and address the disproportionate impact their actions have on minority and low income populations. Clearly, all impacts to the Spokane Tribe and its Reservation discussed above fall within this mandate. Federal agencies cannot escape applying this analysis to the disposal end of remediation actions where, as here, the

licensing entity is not required to conduct a similar analysis. In this regard, environmental justice principles associated with the SLAPS and HISS proposals — as they relate to Dawn's facility — must be satisfied in addition to meeting the government's trust obligations to the Spokane.

CONCLUSION

The Spokane Tribe appreciates the opportunity to submit these comments and the attached comments to the USACE. Please advise at the earliest opportunity whether the consultation sought in these comments can be arranged. Also, please keep me advised as to future developments on this and other FUSRAP projects which might affect my client's interests.

Sincerely,

SHANNON D. WORK
Attorney at Law

SDW.jaf
enclosure

City of Hazelwood

April 13, 1998

Rob Mullins, FUSRAP Project Manager
U.S. Army Corps of Engineers - Public Information Center
9170 Latty Avenue
Berkeley, MO 63134

Dear Mr. Mullins:

The City of Hazelwood is in receipt of the Evaluation/Cost Analysis documents regarding the removal of residual radioactive waste material at the Hazelwood Interim Storage Site and the St. Louis airport Site. The two alternatives offered for cleanup were discussed at the last City Council meeting. The Hazelwood City Council supports the second alternative, which includes the use of minimal quantities of soil below selected criteria.

Sincerely,

David W. Farquharson

David W. Farquharson
Mayor

pc: Buzz Westfall, County Executive
Ric Cavanagh

DWF:ck

dfbl

CITY HALL - PUBLIC WORKS - 839-3700
415 Elm Grove Lane
Hazelwood, Missouri 63042
FAX - 839-0249

POLICE DEPARTMENT - 839-3700
MUNICIPAL COURT - 839-2212
415 Elm Grove Lane
FAX - 838-5169

FIRE DEPARTMENT - 731-3424
6800 Howdershell Road
Hazelwood, Missouri 63042
FAX - 731-1976

PARKS AND RECREATION - 73
1186 Teson Road
Hazelwood, Missouri 6304
FAX - 731-0989

Comments 3/17/98 Mtg

Timothy Flint, the Congregationalist clergyman who wrote up the agricultural possibilities of Missouri, described the Cold Water Creek Valley around 1838 for the benefit of Eastern readers saying, "the soil is fertile to a degree, being a rich, heavy loam of inky blackness."

That along with a description of Cold Water Creek around that time as a "considerable stream of pure water, and on the opposite side is one of the most fertile and valuable prairies in the Country" tells us that the best soil available should be used to replace the contaminated soil that is removed from the Cold Water Creek Valley - also known as the "Florissant Valley of Flowers."

It is a coincidence that this meeting falls on St. Patrick's Day and it isn't always easy being green as we all known from SLAPS and HISS. But perhaps when these sites are cleaned up we can have the greenway oasis so many people have dreamed about on Cold Water Creek for years. [redacted]

[redacted]

Happy St. Patrick's Day!

By Sandy Delcoure
3029 Willow Creek
Vallon des Fleurs
Florissant, MO 63031
(314) 921-6369

Michael V. Garvey
208 Pitman Hill Road
St. Charles, MO. 63304

Dept. of the Army
St Louis District, Corps of Engineers
9170 Latty Ave.
Berkeley, MO. 63134

RE: Written Comment SLAPS EE/CA

March 19, 1998

Dear R.L. Mullins:

I sincerely appreciate the opportunity to make written comment regarding the proposed SLAPS EE/CA. Please send information regarding proposed location for "off site " disposal.

My chief concern has always been the geologic unsuitability of Weldon Springs, Mo. should it be considered as an "off site" location for long term disposal. I now noticed a disturbing change in wording from **"out of state"** to **"off site"**. The additional weight in this area of karst topography may well result in catastrophic collapse This would resulting in rapid ground water migration of the mixed wastes in the solution channels of limestone bedrock immediately underlying the site. This is especially of concern due to the location of the new Madrid fault and the likelihood of a rather large quake in the foreseeable future.

Yours in health,

Michael V. Garvey
cc Joe Ortwerth St. Charles County Executive
cc James Barks USGS
cc Joe Nichols County Engineer
cc Steve McCracken DOE
cc Board Greenway Network, Inc.

APPENDIX E-2: TRANSCRIPT OF PUBLIC MEETING

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TRANSCRIPT_OF_PROCEEDINGS

FUSRAP

SLAPS and HISS EECA's Public Meeting

March 17, 1998

Presented by Colonel Thomas J. Hodgini

Commander, St. Louis District

U.S. Army Corps of Engineers

Hazelwood Civic Center - East

St. Louis, Missouri

ST. LOUIS REALTIME REPORTING & VIDEO

605 Windsor Hill Drive

St. Louis, Missouri 63125

Sandra L. Ragsdale

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APPEARANCES

Colonel Thomas J. Hodgini - Moderator
FUSRAP District Commander, St. Louis District
United States Army Corps of Engineers

Dr. Robert Mullins
FUSRAP Project Manager

Mr. Lou Dell'Orco
Deputy FUSRAP Project Manager

Mr. Dennis Chambers

Mr. Tom Freeman

Mr. Greg Hempen

Mr. Mike Phillips

INDEX

*** *** ***

COLONEL HODGINI: I'd like to first of all thank everyone for braving the weather and joining us here this evening.

Earlier today I met with some of my staff and employees, and I recognize that many of them are wearing Army green, and I thank them for wearing Army green. I see several wearing green here this evening as well, perhaps not in commemoration of the Army but in celebration of St. Patrick's Day. So Happy St. Patrick's Day to everybody.

I'd like to welcome you all. My name is Colonel Tom Hodgini. I'm commander of the St. Louis District of the Corps of Engineers. And I'll be your host this evening. I'm assembled here with members of my staff, project managers and technical experts, as well as other sources of information that I want to be able to give you. And I trust this will be a very valuable and productive time, use of your time this evening.

The meeting today is really two-fold and it's all about communications. The first part of the communications is talking. And the second part, and the most important part, is listening.

So I've got about a 20-minute pitch or so to give you, and that will be the talking part. And then following the talking part will be the most important part where we'll invite you to come forward if you'd like to make comments and we'll listen to your comments and we'll respond to those at the end of the presentation.

You see the agenda here. This is the talking agenda. And my staff has allowed me to cover the first three bullets. Dr. Rob Mullins will give you the essence of why we're here. He'll talk to you about the EE/CA part of the agenda and then he'll permit me to come up here and provide a conclusion and then get the question and answer period started.

We've got to have ground rules. In the Army we call these rules of engagement. Here they're ground rules. I'd just like to point out a couple things there. The third bullet, we would like you to hold your questions for during the question and answer period. I understand there were cards when you walked in and many of you have already filled those cards out. So we'll recognize you during the Q and A period at the end.

Second thing is -- well, these index cards I mentioned.

Last bullet, everyone will have an opportunity to speak. That doesn't mean you're required to speak. But if you'd like to come up here and say something, everyone will be given that opportunity.

And then, finally, if you don't want to say anything orally but you do have some comments, we'll accept your written comments as well.

The St. Louis District here is one of 6 districts in the Mississippi Valley Division of the Corps of Engineers. We're in the heart of the division. It's a long division, spanning from the Canadian border all the way down the Mississippi Valley to New Orleans and the mouth of the Mississippi.

The Mississippi Valley Division is one of 8 divisions in the Corps of Engineers, and the Army Corps of Engineers consists of about 39,000 employees across the continental United States and throughout the world. In the St. Louis District you can pick out the boundaries, but basically we have about responsibility for about 300 miles of

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the Mississippi River, the lower portions of the Illinois River and the Missouri River, 5 lakes, 3 in Illinois and 2 in Missouri, Wappapello and Mark Twain Lake, and 5 locks and dams, 4 along the Mississippi River and 1 on the Kaskaskia River in Illinois.

I'm privileged to lead more than 800 employees in the St. Louis District of the Corps of Engineers. Only 4 are military officers. The rest are civilian service members. All are your neighbors.

At any one time, the St. Louis District is involved in executing flood control, navigation and environmental type projects throughout our district boundaries. The District spans, like I said, from about 300 miles -- that goes from Hannibal, Missouri down to about Cairo, Illinois, the mouth of the Ohio River.

The next slide -- this will be the only eye test this evening. I believe you have a hard copy of this in the packet you received. Suffice to say, much -- from 1940 to where we are today, much has gone before where we are presently at this point in time.

A couple areas I'd like to point out.

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I can't even read it from here. But 1974 FUSRAP was created. 1977 DOE established. And then a very important date, 1989 SLAPS and HISS were placed on the national priority listing.

Another date of importance, 1992, the Oversight Committee was established. And then finally, a very important date for myself and my organization, October 1997, FUSRAP responsibility was transferred from the Department of Energy to the Corps of Engineers.

At this time I'd like to turn things over to Dr. Rob Mullins who will walk you through the EE/CA's. Rob.

DR. MULLINS: Thank you, sir. If I can get the microphone working. I told Lou this is not my best thing dressed up in a suit and tie. I much prefer blue jeans but for some reason it just doesn't seem to work quite that way for a public meeting.

So we want to talk a little bit about both the EE/CA's that we're doing. And we want to start off with the St. Louis airport site or the SLAP site as you are familiar with it. I want to talk a little bit about some of the things that either have happened or will be happening soon.

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This past fall under a Department of Energy contract with Bechtel National, remediation work started on the west end of the airport site. We picked that up during the transfer and completed that work in December.

Some of the things that we've got going on right now are in the planning stages. We're going to construct a new rail spur there and that's going to happen starting in May. We're going to take some action to start on the ditches north of the site. And then we're also going to build a sedimentation basin to make sure that no uncontrolled water gets off the site.

We're doing this EE/CA. That's an engineering evaluation and cost analysis. These are some of the objectives that we had. Number one, primary objective that we had in mind, is protecting human health and the environment.

Second off, we have a number of partners that we're dealing with in the state, federal regulatory community, as well as a number of stakeholders here in the community, not just the citizens but also a number of businesses in the city, the county, many different people.

The airport obviously is a very

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important partner in this, and whatever we do we've been coordinating very closely with them, also with the Federal Aviation Administration, to make sure we're not having a negative impact on their operations.

The last two objectives shown there, again just restore the property for use and make sure it's safe for future uses.

Several of you have gotten the EE/CA's in the mail. We also have copies back there for you to take with you if you'd like. But when you boil it all down, these are the alternatives that we're looking at. We have three alternatives.

The first one, the no action alternative mandated by CERCLA. We have to look at that. What if we do nothing. And that actually costs us some money. We'd have to do some long term monitoring and we're talking about $11 million to do nothing but still figure out what's going on at the site.

We looked at two alternatives that were very similar. Alternative number two, basically to go and clean up the entire airport site, the SLAP site under the EE/CA. And we looked at three different criteria levels. Levels

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A and B are cleaning up to an industrial standard. That's an industrial criteria. And alternative C is looking at a residential standard.

And in a lot of the discussions that we saw when we acquired this project, we looked back at what had been done by the task force, and in working with Rick Cavanaugh and the Oversight Committee. We also looked at this was what you wanted, something that's more like a residential clean-up standard. So that's what we looked at.

We also looked at a third alternative. Same two criteria levels for industrial clean-up, but also a residential level there as well. The difference between the two is really using totally clean backfill material in alternative two, versus using some below criteria materials that we are taking out of the hole, the excavation, in the site.

The materials are below the criteria that we're dealing with. So from that standpoint they're safe to deal with. We see an advantage from a cost perspective to reuse some of that material.

And you can see the prices there. They vary widely, going from kind of a bare bones

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industrial standard up through a very complete residential standard.

From our perspective, what we put out in the EE/CA as our preferred alternative is alternative 3 C. And again, number one, it is protective of human health and the environment. We're going to excavate up to all the material that's out there. We'd also take care of the ball fields and use some of that material to fill back in the hole in the main/property.

We're going to use some of that below criteria material to fill in because it saves some money for the federal taxpayers. All the material that we pull out that's above the criteria level that we've established at residential standards will be shipped out of Missouri to an approved disposal facility.

The difference between this alternative, and alternative 2 C which uses all clean material, no reuse of material, is about $8.4 million. Now this is accounting for roughly 7,000 cubic yards of material that could be reused in the site.

There's the potential from other vicinity properties around the airport to get an

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additional 23,000 cubic yards of material that could be used if the timing works out as backfill. And that could save another 5 to 10 million dollars. But that was not included in the cost computation.

So on this alternative, if we go through with this the way it's scheduled, we can begin work this summer.

These are the critical dates that we have to remember. We're here obviously tonight on St. Patty's Day. You can submit written comments up through April 6. So that's the important day for this particular EE/CA.

We also looked -- we decided we'd work with the Oversight Committee to try to determine whether we should have separate meetings to address the airport site and the HISS site, the Latty Avenue site. We also talked with the regulatory community to get some feeling. There's a feeling that these were best addressed together because they're both north county sites.

So, Lou, if you would. Same general kinds of objectives. A little twist here is because we also have a number of industrial properties that are surrounding the Latty Avenue

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site. The Hazelwood interim storage site is what HISS stands for. And we need to make sure we're not going to have much disruption of the on-going businesses there because that would hurt them. It certainly wouldn't do any good for the job creation there.

We're going to be constructing a rail loading facility as a part of this. That's included in this particular package. It's a part of both the alternatives. And main thing is trying to get the piles that are out there on Latty Avenue off the site. We're not really looking at the subsurface work in this EC/CA, this particular document.

Same format that you saw on the other slide. These two alternatives are very similar. Primary difference between two and three is that in two what we'd be doing is segregating some of the below criteria material, just as we talked about on the airport site, to use to fill in some holes later on.

And right now it's estimated to be about 8,000 cubic yards. So there's some savings there. And you see the few million dollar savings between the two alternatives. That's really the

primary difference between these two.

But the goal is to clean up some of the vicinity properties and also get rid of the piles. So we go through.

Alternative two which involves the segregation and storage of that below criteria material, putting it on the side for some future use. Constructing a rail spur to make getting this material off-site a little bit easier is in here.

All the material that's above criteria will be shipped out of state to an approved disposal facility. None of it is going to go back into Missouri. This saves a little under $4 million. And again work could begin this summer on this alternative.

A little bit longer deadline on this. We had about a three-day swing when we got the documents out to you all for review. So we've got 'til April 9th to receive written comments. The record will be open until then. So we welcome your comments.

Those will be included in the documents for both the HISS site and the airport site. We will prepare a response to every comment

we receive and that will be included in what's called a responsive summary. Then we'll get to an action memorandum.

This is kind of the overall schedule for finishing up the documents. We go from here through the end of the comment periods that we've talked about. Once we have the comments, we respond to those comments, we make adjustments to the plans, or our recommendations, if there seems to be a need to do that.

If there's overwhelming support for a different alternative than what we selected, then we will have to weigh that and potentially change our mind based on the comments that come back. But we'll have too look at the impact of that.

So the goal is to have a decision document completed on both of these by the end of June and to get into construction, moving this radiological material out of the State of Missouri starting in July.

These are some of the ways that we can stay in touch. We do have an on-site gentleman, Mr. Chris Haskell, which some of you met. He's out there on site every day. And so if you have questions or concerns you can reach him by phone

or by e-mail. And these are some of the things.

I'd like to turn it back to Colonel Hodgini to wrap up.

COLONEL HODGINI: Thanks, Rob. Wrapping this part of the session up, I'd just like to say two or three things. First of all, when we look at that site history slide I want to acknowledge -- I'd like to acknowledge that there's been a lot of effort and a lot of work that has gotten us to this point. A lot of work on behalf of the Department of Energy, EPA, the State of Missouri, the Missouri Department of Natural Resources, and very importantly, the Oversight Committee and the local community who have worked very hard to get us to this point. So I acknowledge that up front and say we're on the verge of meeting some early objectives.

Last October when the President approved the transfer of this program from DOE to the Corps of Engineers, my boss two levels up, Lieutenant General Ballard is the chief of engineers, summoned myself and about four of my fellow district managers to Washington to give us guidance. And it's common in the Army for higher level commanders to give subordinate commanders

guidance and directives. And so I duly reported to Washington.

And he said a couple things that have stuck with me. Number one, he called -- he said, remember, the most important thing that you've got to keep in mind to be successful -- I'll back up. He said I expect success and here's how I define success; he says I define success as satisfying the customer. And that's why we're here tonight. You all are the customer.

And the second thing he said that stuck in my mind, he referred to this FUSRAP as a mission rather than a project. And mission in the Army has connotations above and beyond a project. When I think of a mission I think of objectives and I think of pulling all the resources available to accomplish that mission. A little bit different than a project.

The final objective in this case in my mind is remediation, removing the contamination and replacing it with clean material.

An intermediate objective, what we're talking about tonight, is the documents that we need in place to reach that objective. In this case the EE/CA's. And later on we'll be talking

about a record of decision. But right now we're talking about the EE/CA's. So that's the intermediate objective. We need to accomplish that before we can move on to the final objective.

We've got a lot of experts up here and we're prepared to now respond to your questions. But I would like to keep that in mind, that this for us is a mission, we're not looking at a project 10, 20 years to continue on. But we're looking to get to that final objective just as quickly as we're able to, given the constraints and the resources that we, of necessity, must operate under.

Okay. Must be time for questions. We have some cards up here and the microphone.

DR. MULLINS: We will bring a microphone to you. If you would, make sure you state your name and organization so we can have the reporter get that entered in the record.

COLONEL HODGINI: Several questions. First, I'd like to introduce Mr. Steve mahfood, the Missouri Director of the Department of Natural Resources. Steve. Thank you for being with us tonight.

MR. MATTHEW: Thank you very much.

Good evening. As some of you may know, I served Governor Mel Carnahan as a director of the Missouri Department of Natural Resources.

The Missouri Department of Natural Resources is the environmental quality and resource protection agency for Missouri state government. Tonight I'm here to present formal testimony on behalf of the State of Missouri regarding the Corps of Engineers clean-up proposals for the St. Louis airport site, the Hazelwood interim storage site, and associated vicinity properties.

As you know, uranium was refined in St. Louis from 1942 to 1957 for the nation's nuclear weapons program. Radioactive waste resulting from those federal weapons production activities now contaminates properties in both St. Louis City and St. Louis County.

Governor Carnahan has strongly urged the responsible federal agencies to move forward with the clean-up of nuclear weapons production wastes and do this in a manner that leaves the property owners whole. This anticipated clean-up is long overdue.

The Corps of Engineers is to be

commended for proceeding expeditiously with this clean-up project that's been assigned to them by Congress. I believe that the Corps may be on the verge of initiating an extremely successful clean-up that would be consistent with the recommendations of the St. Louis site remediation task force.

The Corps has made the correct decision in the selection of the 5, 15 clean-up criteria. This is the proper technical clean-up criteria and it's in agreement with the wishes of area citizens.

The State of Missouri supports alternative 2 C for the St. Louis airport site and vicinity properties. Following the same principle, the State of Missouri supports alternative 3 in the Hazelwood interim storage site and its associated vicinity properties.

In the case of the St. Louis airport site and the Hazelwood interim storage site, the use of contaminated material between 5 picocuries per gram and 15 picocuries per gram for backfilling purposes poses several significant problems that we don't feel can be justified by the very minor projected 4 percent cost savings.

The Corps of Engineers proposal to use the below criteria, but nonetheless contaminated, material we feel would have the following impacts: one, it would make the clean-up more complicated; two, it would require the segregation of waste during excavation; three, it would require the stockpiling of contaminated materials for an undetermined time; four, it would require that stockpiled waste be protected from wind and water and erosion for lengthy periods of time; five, it would require much more extensive sampling and analysis; and finally, we feel it would violate Missouri's solid waste law.

I sincerely hope that the Corps will reconsider its position with respect to the use of below criteria material for backfilling. If the Corps would decide to use clean fill for backfilling, we absolutely feel there would exist a broad agreement between citizens and their government regarding the proposed clean-up.

Thank you for the opportunity to comment.

COLONEL HODGINI: Thank you, Mr. Mathew.

DR. MULLINS: Steve, we appreciate the

comments. We agree on the criteria. I think we will be working with your staff on some of the issues, particularly the legalities with relation to the Missouri solid waste law. We have a slight difference of opinion there, but I think we can work it out.

The reason we want to get everybody's feedback is so we can see if we've made the right decision or if we need to change it. Thank you very much.

COLONEL HODGINI: As we proceed through this question and answer period, what I'm going to do -- and you'll see me refer to the staff of technical experts here, because, one, I want to give them some face time with you, and number two, they'll give you the most technically correct answers.

Okay. Next question. Miss Anna Ginsburg will be making a statement of behalf of Colonel Griggs and Mayor Harmon.

MS. GINZBERG: Good evening. I'm here this evening representing the City of St. Louis and the St. Louis Airport Authority. And the City and the airport are interested in the airport site primarily because it does impact the operations of

the airport and it's also owned by the City of St. Louis.

We support alternative two as described in the EC/CA: the excavation and disposal of the waste at the airport site and the ballfields.

We also support using the strictest proposed clean-up standards for alternative two, including clean-up of Radium 226 to levels of 5 picocuries per gram for the surface and 15 picocuries per gram for the subsurface; clean-up of Thorium 230 to levels of 5 picocuries per gram for the surface and 15 picocuries per gram for the subsurface; and clean-up of Uranium 238 to levels of 50 picocuries per gram for both the surface and the subsurface.

We also support the use of "clean" soil to fill in excavated areas rather than soil from the site that remains contaminated below the criteria of 5/15 and 50.

We favor this alternative because we believe it has the support of the public and because it fits most closely with the recommendation of the St. Louis site remediation task force regarding clean-up of the airport site.

This body, representing a broad range of stakeholders, met for over two years and worked through a variety of diverse options to come up with a nearly unanimous recommendation on how to proceed with the clean-up of the FUSRAP sites.

Furthermore, in 1988 an overwhelming majority of citizens in both St. Louis City and St. Louis County made it clear that they did not want to see the airport site turned into a permanent storage bunker for radioactive waste. And we are concerned that the storage of any contaminated soil, no matter how low the level, may be perceived by the public as a step toward establishment of a bunker at the airport site.

An additional reason for rejecting the below criteria backfill is stated on page 5-6, Section 5.2.2 of the EC/CA. This statement points out the fact that the need to segregate these above and below criteria soils during removal would complicate the excavation.

Complications on projects of this nature often bring increased costs. And the City of St. Louis does not believe that the minor cost saving is worth endangering the public health in the areas surrounding the airport. We firmly

believe that clean soil must be used as backfill at the airport site.

We also want to reiterate our support for continued public participation in the clean-up process of all the FUSRAP sites in St. Louis City and County. Through years of discussions and dialogue among diverse constituencies, this region has established a consensus on how to proceed with the clean-up of these sites.

And in order to maintain this consensus and implement the work plan, we encourage the Army Corps of Engineers to work closely with the St. Louis Oversight Committee on radioactive waste and the public in general.

It is especially important that the Army Corps of Engineers officials coordinate closely with airport officials to make sure that all clean-up activities at and around the airport are consistent with the guidelines of the Federal Aviation Administration.

In closing, we want to note that in keeping with the spirit of the regional consensus on this issue, we've worked closely with our counterparts at the State of Missouri and St. Louis County to achieve consensus on our

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positions.
We are united in our belief that alternative two, with clean-up to the 5/15 and 50 standard, is the best option for the airport site clean-up.
COLONEL HODGINI: Okay. Thank you, Anna. We do remain committed to continue to include the public in everything we do and be open and honest in all our business processes. And as Rob mentioned earlier, we'll continue to look at the use of below standard material.
Okay. Next we have Mr. Rick Cavanaugh.
MR. CAVANAUGH: My name is Richard Cavanaugh. I'm the chairperson of the St. Louis FUSRAP Oversight Committee.
I also want to state for the record that I live on Coldwater Creek. So I have a personal involvement in terms of the concerns about the creek and what flows from here to there where I live.
I want to read a statement from the County Executive of St. Louis County, Buzz Westfall. He's not able to be here this evening. As you may have heard, he's had some hip

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replacement surgery and he's not moving around as well as he would normally be doing. So he is not here.
I'm also glad that I don't have to say picocuries as many times as Anna did in her statement. It's very difficult for an Irishman on St. Patrick's Day.
But this is a statement from the County Executive.
In 1990 I made a campaign promise that I would work with this community to safely remove all radioactive wastes from north county. Our county is home to more than 1 million people and it's one of the most populated regions in the State of Missouri.
Radioactive wastes should not be stockpiled anywhere near St. Louis County's residents, its water supply, its creeks, its air or its groundwater.
Since 1990 a coalition of concerned citizens and county, state and federal officials have worked hard to get the attention of the Department of Energy to secure funding to remove this waste. Now working with the Corps of Engineers, we are on the brink of approving the

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EC/CA process to make it happen.
As County Executive, I strongly support alternative 2 C for the clean-up of SLAPS, and alternative 3 for the clean-up of HISS which provides a backfill of clean dirt. These are consistent with our task force recommendations.
I will take whatever actions necessary to ensure that north county is cleaned up to the highest possible standards to protect residents, industry, Coldwater Creek, our drinking water supply, and the future of economic development in this region.
Thank you. That concludes his statement.
I would also want to add personally that while there's some minor disagreement perhaps relative to the choice of soils, if you will, for the backfilling of this project, I do want to say that we are very, very pleased with the cooperation and the communication we've received from the Corps of Engineers. It's been a delightful change perhaps, to be honest, from what we have experienced in the past. And we look forward to working collaboratively to getting this project done in a cost effective fashion. Thank

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you.
COLONEL HODGINI: Thank you, Rick, and I believe we're on the same path.
Next comment will be made by Mr. Bob Cook from the Missouri Attorney General's office.
ASSISTANT ATTORNEY GENERAL COOK: Good evening. My name is Bob Cook and I'm Assistant Attorney General for the State of Missouri.
It is our understanding that the Corps would prefer to backfill contaminated radioactive soil to save a relatively small amount on the clean-up's total costs.
We are disappointed that the Corps would rather cut corners than do everything it can to protect the public health, safety and welfare of the people of Missouri.
This miserly approach would reduce the expected costs of the SLAPS clean-up by only about 4 percent from about $219 million for clean fill to about $210 million dollars for below criteria fill.
The savings at the Hazelwood interim storage site would be about 3.5 million, a reduction from 73.5 million to about $70 million, overall only a 4 percent cost savings.

In addition to being disappointed by the Corps's preference to cut corners, we are concerned because backfilling contaminated soil would violate the Missouri Solid Waste Management Law. This law broadly regulates solid waste, including radioactive wastes. It is unlawful to dump solid wastes on to the ground in Missouri. It is also unlawful to store or dispose of solid wastes in such a manner as to create a public nuisance or adversely affect the public health.

In our view it would be unlawful for the Corps to backfill contaminated soil. Stockpiling below criteria materials and backfilling it at various sites later would violate Missouri law. It does not matter whether the contaminated soil is termed hot or cool by federal agencies. Backfilling it would violate this statute.

We stand ready to protect the people of Missouri from continued exposure to radioactive waste generated, stored and placed around Lambert Field by the federal government a generation ago. All affected properties must be backfilled with clean fill. Nothing else will do. Thank you.

DR. MULLINS: I understand your

concern. We did not choose this alternative lightly. We did go through our attorneys and we got an attorney's opinion that in their opinion the backfilling with below criteria material was legal.

We had some discussions with MDR&N in particular about that and we knew there would be more discussion to come. But we do appreciate the comment. Thank you, sir.

COLONEL HODGINI: Thank you, Bob.

The next comment will be made by Miss Mimi Garstang; is that correct? MD&R.

MS. GARSTANG: My name is Mimi Garstang and I'm pleased to comment on the EC/CA for the St. Louis airport site, SLAPS, and the Hazelwood interim storage site, HISS, that were developed by the Corps of Engineers in March 1998.

I'm making these comments on behalf of the state geologist, Dr. James Williams.

The state geologist has always been concerned about the protection of the aquifer that lies beneath the SLAPS and HISS site. This aquifer is being used as a source of drinking water north of the sites.

It is his unquestionable desire to

proceed with the expedited removal of the sources of contamination at both the SLAPS and HISS sites. Dr. Williams believes that clean-up of the soils to levels of 5 picocuries per gram of Radium and Thorium in the first six inches of soil, and 15 picocuries per gram at depth, and 50 picocuries per gram of Uranium at any depth will be protective of the bedrock aquifer.

Source removal will greatly reduce the risks to the aquifer. The state geologist is aware that shallow groundwater at both SLAPS and HISS has already been impacted by the waste at the site. The shallow groundwater is directly in contact with contaminated material during a large portion of the year.

Therefore, the sooner the waste is removed, the less chance of further degradation to groundwater.

Alternative 2 C in the SLAPS EC/CA and alternative 3 in the HISS EC/CA are the proposed actions that are the most protective of both human health and safety and the environment. They are less complicated alternatives as compared to some of the other options suggested. Neither of these alternatives require stockpiling excavated

materials for extended periods of time which could lead to difficult management of run-off and erosion from the piles. They will not require the intense testing and sampling of contaminated material necessary to segregate the various levels of contamination for below criteria soils to be properly placed as backfill.

Therefore, the state geologist supports alternative 2 C at SLAPS and alternative 3 at HISS as the preferred alternatives to protect the aquifer of concern and expeditiously remove the sources of contamination.

I want to thank you for the opportunity to present the state geologist's comments on the documents under review.

COLONEL HODGINI: Thank you, Mimi. Of course we're very committed to removing the contaminated materials as expeditiously as possible.

I'd ask my staff if anyone would want to comment on the aquifer or the groundwater.

MR. HEMPEN: I'm Greg Hempen. I'm a geophysicist with the St. Louis District. I'm a personal friend of Mrs. Garstang's and Dr. Williams'. And we appreciate their comments. We

happen to agree with their stance of protecting the groundwater. We hope to do that and move forward with removing the material that's particularly conducive to risk to the public.

We want to lower the risks, both to the public and the environment as quickly as possible.

COLONEL HODGINI: Thanks, Greg.

Next we're also privileged to have represented here with us this evening Congressman Talent's staff. Miss Barbara Cooper, would you like to make a comment?

MS. COOPER: Thank you. I did not come to read a comment. I came to listen to your comments and concerns. And so I will be taking those back to the Congressman. I appreciate very much the opportunity to be here this evening and to hear what is said. Thank you very much.

COLONEL HODGINI: Thank you, Barbara, for being with us this evening.

Also with the Task Force Oversight Committee, Miss Nancy -- and forgive me if I mispronounce your name -- Lubieski.

MS. LUBIEwSKI: I'm not Polish. Yes, my name is Nancy Lubiewski. I'm a member of the

task force. And I was also a member of the prior task force. First, we had a task force. Then we had the Oversight Committee. We changed names, right, okay.

And somebody put out the date, 1990, Buzz Westfall's office started getting the people together for this. That's 8 years. I would guess 7 years we worked with the Department of Energy. And at that time as a committee we did compromise. We did go over numbers. And we haggled. And did study, research, sent some people out of town.

Came back and the final report was the compromise. As the Oversight Committee, we agreed and promised the task force that there would be no more compromise, that this is what we were going to ask for. At no time did we say anything about anything else but clean backfill. The criteria was the 5/15, 50.

The bunkers, the storage bunkers, were not an option. There's too much fear that storage bunkers then may stay permanent.

And these things need to be addressed. This is a lot of work in the past. And the compromises already have been made.

And I hope you sincerely look at the

prior documents and look at all the work that was really put into it, because we put in a lot of time, a lot of volunteer time.

And at this point I can't see anything else but clean backfill, putting it on a shipment, cargo bin, and shipping it out. I just hope you look at the old documents.

COLONEL HODGINI: Thanks, Nancy. We're listening.

Okay. Next person is Miss Sandy Dilcor.

MS. DILCOR: I'm Sandy Dilcor living on Coldwater Creek.

Timothy Flint, the Congregationalist clergyman, who wrote on the agricultural possibilities of Missouri described the Coldwater Creek Valley around 1836 for the benefit of eastern readers saying: The soil is fertile to a degree, being a rich heavy loam of inky blackness. That long of a description of Coldwater Creek around that time as a considerable stream of pure water and on the opposite side is one of the most fertile and valuable prairies in the country, tells us the best soil available should be used to replace the contaminated soil that is removed from

the Coldwater Creek valley, also known as the Florissant valley of flowers.

It is a coincidence that this meeting falls on St. Patrick's Day and it isn't easy always being green as we all know from SLAPS and HISS and Mallinckrodt.

But perhaps when these sites are cleaned up, we can have the greenway oasis so many of us have dreamed about on Coldwater Creek for years.

COLONEL HODGINI: Thank you, Sandy. We share your vision of returning the valley to the one described in the 1800's. Thank you.

Okay. Next person to comment, Mr. Donovan Larson from St. Louis County Water Company.

MR. LARSON: Thank you. I'm Donovan Larson. And I had been a member of the previous citizens task force, and was part of the group that reviewed the various options that the Department of Energy presented over the years.

My particular interest has been in the protection of the field workers at St. Louis County Water Company has to get itself pipeline maintenance. We've been concerned over the years

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that our exposure or the exposure that we allow our workers to encounter be minimized.

And so we're very happy to see that this report has suggested clean-up to background levels. We do support the 2 C and the 3 options of the SLAPS and HISS site.

I would also as a former member of the citizens group like to point out that the EC/CA unfortunately is pretty sketchy in repeating some of the work that was done investigating the groundwater contamination potential. And I would urge the Corps to consider going into a little more depth in addressing that part of the environmental decontamination in its final draft.

COLONEL HODGINI: Just a second while we change cassettes.

Greg, would you like to respond to the groundwater contamination question please?

MR. HEMPEN: My response would be that the EE/CA's were considered interim actions to remove source material, get it removed from the public as quickly as possible. We don't feel that this is the end of the actions that we're involved with. And as a matter of fact, for both sites there will be additional work to assess the

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impacts on groundwater in particular that you describe.

But those actions we perceive now as moving toward monitoring particularly deep groundwater and its effects. And we're moving the surface contamination as quickly as possible so we diffuse and eliminate the impacts to surface waters, the near surface groundwater.

COLONEL HODGINI: And do keep in mind, I know everyone here is aware, this is an interim objective. I talked about interim objectives and the final objectives. And this is the opportunity to remove some soil, contaminated soil, as expeditiously as possible.

Well, I've run out of cards. Did I miss anyone? Is there anyone else who would like to make a statement? Please, sir.

MR. MARK: My name is Ed Mark. I have two questions, no comments.

At one time they were saying the window for disposing of the radiated waste was a definite thing out there in Utah, and they didn't know how long it would stay open.

Do you have any further word of how long Environmental Care, or whatever the name is,

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is going to be accepting things from St. Louis?

COLONEL HODGINI: Right. Go ahead, Bob.

DR. MULLINS: Sir, right now it looks like Envirocare is going to be in business for quite a while. But one of the other initiatives that we've done here in St. Louis on behalf our other sister districts that Colonel Hodgini talked about at the beginning of the presentation, we're pushing a series of national disposal contracts to look for additional sources, additional places, where we can dispose of material. And we think that those are out there.

And right now we're pursuing those. We hope to have some new contractual vehicles, new disposal sites, on line by the end of this fiscal year, which for us ends in September. Hopefully sooner.

MR MARK: Well, this was gone through before and they had a lot of people come in and talk about available sites and so forth. It's, you know, sort of important to see whether they're going to be accepting whatever you're going to be digging up.

DR. MULLINS: Yes, sir, and we have

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been looking at that and we do believe there are alternatives.

MR. MARK: The other thing is that there were two notices in the paper about the MSD, Metropolitan Sewer District, having two meetings, one on the 23rd which is going to be discussing Coldwater Creek from the airport south, and the 24th discussing Coldwater Creek from the 24th -- from the Lambert north on the following day.

I don't know anything about what they're going to be talking about. Do you gentlemen know what they're going to be talking about?

DR. MULLINS: I do not, sir.

MR. MARK: Then I would like to suggest that you have some representative there because Coldwater Creek has been overflowing the banks for 20 years. And anything you do is going to be compounded by any flooding problems which are still around and going to be around for a while. And so they may be attempting to eliminate some flooding problems, I don't know.

But it would seem to me to be very important to you to coordinate with them.

COLONEL HODGINI: Thank you for your

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suggestion. I'll have my staff contact them. Appreciate it. All right.

Would anyone else like to make a comment or are there any other questions?

UNIDENTIFIED MAN: I'd just like to ask how soon are you going to be putting in the rail spur at SLAPS? And will you be using subcontractors or will the Corps bring in their own people to do this work?

DR. MULLINS: Mike, I think you're probably the best one to address that.

MR. PHILLIPS: My name is Mike Phillips. I'm the construction manager with the Corps of Engineers here at the FUSRAP sites.

With regard to the SLAPS rail spur, the contractor that was turned over to the Corps of Engineers at the time the program was turned over from the Department of Energy, that being Bechtel National, is effecting the contract to install that rail spur at SLAPS.

They have advertised, and if I understand correctly, have identified a contractor that will be doing the actual installation. Installation should be starting some time in May.

I believe you also asked about the

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HISS spur. The same contractor, Bechtel, will be soliciting bids for that installation also.

UNIDENTIFIED MAN: Has the contract been awarded for the SLAPS spur?

MR. PHILLIPS: Award is imminent. Award has not been made at this time.

COLONEL HODGINI: I believe there was another question.

UNIDENTIFIED MAN: I just wanted to ask, in regard to the criteria that you're talking about clean-up, a couple things. One comes to mind automatically. There is no mention of an ALARA goal -- as low as reasonably achievable -- in the criteria. And I know this is an interim response action. But when you do your design engineering, when you do the design, do you have a buffer implied or what's your design criteria? Is the design criteria the background plus 5 picocuries surface and again 15 for subsurface?

And when you do your removal, how do you define that removal? Are you going to do sampling or walkovers? Or how are you going to define that you've met the criteria? What quality control do you have to assure?

And the other thing is why don't you

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use a combined Radium number 226/228 rather than just using 226 for your surface and subsurface? Thanks.

DR. MULLINS: I think we have a couple of different questions in there. Probably we'll have Dennis Chambers address the health physics question and Tom Freeman address the engineering question. Dennis.

MR. CHAMBERS: The first question with regard to the issue of the Radium 226, I think the background behind that is that approach was developed based upon on the mill tailings, the UMTRA standards, which were established a number of years ago. It's a standard approach that's been used.

UNIDENTIFIED MAN: 192?

MR. CHAMBERS: Excuse me?

UNIDENTIFIED MAN: Are you talking about 40 CFR 192?

MR. CHAMBERS: Yes, exactly. That I think is the basis for it, and all of the calculations that have been done, the risk assessments and so forth, do show that it is protective of health and the environment.

At the same time the ALARA

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principle -- well, obviously as we go through, the actual design of the remediation is going to be a major consideration to make sure that the exposure both to the workers on site, as well as to the members of the public, are kept to a level as low as is reasonably achievable, and the site as it is ultimately designed also meets the ALARA criteria.

MR. CHAMBERS: There's a question on the construction you said?

UNIDENTIFIED MAN: Well, I just wanted to ask you, as far as this meeting of criteria from the design phase to the actual construction, how are you going to assure that you're meeting those criteria?

MR. CHAMBERS: The approach that we have, there is something that's called a Multi-Agency Radiation Site Survey and Investigation Manual. It's been approved in January of 1998 by the EPA, the Department of Defense, the Department of Energy, as well as the Nuclear Regulatory Commission.

And the MARSSIM document does provide guidelines and approaches for doing those types of final site surveys. And we will to the maximum extent possible follow the MARSSIM guidelines.

COLONEL HODGINI: Does that respond to your question?

UNIDENTIFIED MAN: Yes, I was just curious, is there going to be third party independent oversight or is this going to be Corps of Engineers actually doing the criteria or do you have subcontract personnel, you know, doing this?

MR. CHAMBERS: The actual methodology for the final site survey is currently being developed. And it will be developed according to MARSSIM guidelines.

UNIDENTIFIED MAN: So it's not part of the interim response action or part of any EC/CA document?

MR. CHAMBERS: No, it is currently being addressed at this point for specifically that reason.

UNIDENTIFIED MAN: Okay, thank you.

COLONEL HODGINI: Thank you for your question. Other questions? Over here.

UNIDENTIFIED MAN: I'm a property owner adjoining Coldwater Creek. I was here at the last session you had. My thought is you have a little taste of the groundwater today. What's going to happen in the next two months is going to

be three or four times more than this. I've lived here 45 years and we're in our wettest part of the spring.

I was interested, there was a contributory creek somewheres over by Latty Avenue I believe and it runs into Coldwater Creek. And I believe it comes from your storage piles. The reason I knew there was a creek there, I used to ride a horse over there and I told my kids to stay out of that creek because it's too soft.

Now if you disturb something over there, is the groundwater going to wash it into Coldwater Creek?

COLONEL HODGINI: Greg, can you --

MR. HEMPEN: The piles at HISS have what is called a ring ditch around them. And water is collected and goes through a weir so we know the volume of water being moved off.

That is separate from the tributary that is to the south of those piles. There is a separate intermittent stream that the rail tracks have to cross to get to the spur over there. And there's several rail spurs that go both west and east of the site.

But the bottom line is there is a

tributary over there. It does not receive that water from around the piles. That water is collected. And yes, I'm certain that it's measured before it gets removed from the site. So it is not being put directly into that tributary.

UNIDENTIFIED MAN: I know I spoke once before at the other meeting about the site over at Lambert Field by McDonnell Boulevard. You were going to put a retainer or something there to keep the water from washing -- the ground washing over into that.

I see you've been working on that. Now is that the final stage of that project right there?

MR. HEMPEN: If I may respond again. There is a Gabion wall over most of the western side of the SLAPS site which is the east wall of Coldwater Creek along the airport site. That won't be the final stage of that workings for that bank. That bank will have to be removed because there's contaminated material behind it.

But that Gabien wall is a protective measure to prevent erosion of the bank and sloughing of that material into Coldwater Creek. So it's a means to stabilize that site.

And in the EC/CA that currently exists for the site and the future EC/CA, we plan additional stabilizing efforts so that the storm water surface run-off reduces the amount of contaminant material being carried into Coldwater Creek.

UNIDENTIFIED MAN: The reason I notice this driving along there, I thought if that's the only protection you're going to have there -- I've been over to McDonnell Boulevard and I saw water come up underneath that bridge to hit the bottom of the bridge. If it gets that way again it's going to come back over into that project, what you're going to work on.

MR. HEMPEN: I'd like to say that the Corps recognizes that all of these are just interim actions. We are attempting as rapidly as possible to stabilize the site and prevent other contaminants from not only getting into Coldwater Creek, but into the air that affects the public around it, and into the groundwater.

So those are our objectives, to protect first the public, and then the environment, because it will later protect the public by those prevention measures. All of these

are just interim until the site is fully cleaned up.

Prior to that remediation there's a potential for other things getting into the environment, and that's why we would like to expediently move to remove these what's called the source contaminants from the site.

COLONEL HODGINI: Thank you. Sir.

MR. MARK: This just occurred to me when I was listening to everyone. I've been involved in this, just looking at things for maybe 10 years on and off. And I have a very fuzzy idea -- because I've never seen a chart by anybody who traced the old stream beds on the Callahan farm which is the site of SLAPS.

Now the reason this might be important -- it's like the home owner over there said -- when you dig some dirt out of SLAPS, the site of the old streams over there, since according to what I've been told by Kay Drey, is SLAPS was a ditch between two streams. If that's true or not I don't know. But that's what her recollection was.

So what I'm saying is I've never seen a chart or a map where let's say when the waste

was dumped back in the 1950's, I've never seen what the water pattern was in 1950 before you filled it up. Because if you defill it up, then you're going to get that water pattern again. And who knows what's under the waste. I mean you may have some strange stream condition, even a sink hole, I don't know.

Because there was a lake at the site of the airport. This was a big lake. And that was drained through some type of engineering or dried up or whatever. So that area is rather low. And I'm suggesting somebody find out what the -- where the stream -- where the creeks were in 1950 because it may be important when you start digging this stuff up. It's just a guess.

MR. FREEMAN: I'm Tom Freeman with the Corps of Engineers. We have sent a group of people up to Washington, D.C. to look at the National Archives up there and obtain historical documents and records concerning the SLAPS site, the Mallinckrodt site, anything that we can find out on HISS.

And we did find some photos. We will be getting photos, hopefully the earliest one is going to be about 1938 of the actual site over

there. So we might be able to see something there.

Fortunately, there were a number of agencies, the agricultural service, the defense intelligence agency, all flew the airports during that time as we were getting ready for the war. So we're hoping to have a chronology of the site history and actual air photos starting back in the late 30's and going on up through the mid 50's. So we will be able to tell things like that.

COLONEL HODGINI: Thanks, Tom. Greg.

MR. HEMPEN: If you don't mind I'd also like to respond that the geologic record is very good in itself for appraising just the things you were talking about. We do know that the stream meandered quite a bit just from the sediments adjacent to Coldwater Creek. And so we are going to utilize that information also with the air photos.

MR. MARK: Excuse me. I'm not talking about the Coldwater Creek. I'm talking about the water drainage from Eva Avenue through the SLAP site on both sides of the SLAP site which entered into Coldwater Creek. There's a difference. I'm not talking about Coldwater Creek.

There was an existing stream pattern with gullies in there, and all this waste was dumped into the streams into the existing dug out area.

MR. HEMPEN: That material will be developed by the air photos. These air photos that we're trying to get from the archives will predate the time when those wastes were taken out there.

What I was recommending is that things that predate man's use of this site are still there in the geologic record. And we're trying to utilize that to help us understand how material can move off the site also.

MR. MARK: Fine. Do it both ways. That's great.

COLONEL HODGINI: A question back here please.

MR. SKIDMORE: My name is Jason Skidmore. I was wondering when was the last recorded accurate survey done on the property? Because if there's a problem with flooding -- I work for a surveying company and a lot of times when we have areas that are flooded we have to do flood certificates on it. If the creek is

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flooding, when was the last survey done on the property to determine the limits and, you know, just the boundary of each of the properties?

MR. FREEMAN: I know that the Corps of Engineers had actually initiated a study, a flood plain study, for Coldwater Creek. I believe back in the late 70's is when that was started.

And we had anticipated doing different channelization, different type of work along there to stabilize it. And it was put on hold because they found contaminated material in there. We didn't know where it came from at that particular time.

So I do know that we do have some very accurate maps from back in the 70's back in the Corps. I don't know how recently Bechtel or any of the other contractors have performed any surveying out there. I believe there's been some surveying done particularly on the west end in the 1990's.

MR. SKIDMORE: Yes, sir. I'm sure that a lot of the companies in the region -- I know my company, we have crews that work only with contaminated sites. And it seems to me like it would be pretty important to do that, and if

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you're going to do that, are you going to use Corps of Engineer surveyors or are you going to subcontract the work out? Or do you have any idea yet?

MR. FREEMAN: As we get into the actual construction we will be using whatever contractor we're using on that particular site. There are a number of contracting mechanisms that we will be using. We're going to be starting on the east end with one particular contractor. That might be the same person that would be doing the surveying work for us. That hasn't been let yet either.

COLONEL HODGINI: Thank you, Jason. Other questions?

MS. PRICE: My name is Sally Price. I'm on the Oversight Committee. I saw the material here tonight on this handout, sedimentation basin. And I don't know where that's going to be. You're going to construct that in June of 1998. Can someone speak to that?

MR. FREEMAN: As part of controlling the material that's on the site and reducing any of the run-off that may eventually impact Coldwater Creek, we're proposing as part of our

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remediation work to install a basin that would be immediately to the east of the west end remediation that was done already.

There will be a basin I believe about 4 and a half acres possibly. It would not be one, the way we're presently anticipating it, that would be holding water there. But it would be one to control the sediment that would be on the site.

We would still be allowing the water to run off in a gradual fashion, but trying to keep any of the sediment from running off at the site. It would be a segmented type of sedimentation basin to kind of slow down the flow as it was going through there and eventually go through some sort of a bottom drain. It would be on the western portion of the site about a third of the way in.

It would eliminate -- if you're real familiar with the site -- it would probably eliminate that southernmost ditch on the SLAPS property itself, and would also eliminate the ditch that's on the north side of SLAPS, but on the south side of McDonnell Boulevard.

So it would take both of the ditches that run on either side and run them into the

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sedimentation pond. We try to control all the water and funnel it down into one place.

MS. PRICE: Into the center?

MR. FREEMAN: Right.

COLONEL HODGINI: Can you address the time frame for that, Tom?

MR. FREEMAN: We were hoping to do that as one of the very first options, just to be able to control the material on the site to prevent any kind of future run-off of material from the site.

COLONEL HODGINI: And the duration?

MR. FREEMAN: As far as construction?

COLONEL HODGINI: Right.

MR. FREEMAN: I think that they were looking at something that would probably be able to get in there in about 3 or 4 months. So hopefully having it done this fiscal year.

COLONEL HODGINI: Other questions or comments? If not, I invite my staff, if anyone would like to comment on anything.

DR. MULLINS: Just one quick reminder. We'll be accepting comments between April 6th and April 9th, April 6th for SLAPS, April 9th for the Hazelwood site, and we really want to hear from

you. So we've got some postage paid comment forms in the back to make it easy for them to get to us. Please use them. We thank you for coming. Anybody else?

COLONEL HODGINI: Okay. In the way of closing I would make one comment myself. We in the Corps of Engineers in the St. Louis District have a lot of experience working on different projects, like I mentioned earlier in our briefing, flood control, navigation, environmental, stewardship, projects that cross a broad spectrum of work.

And most of our projects are done in conjunction with sponsors and in partnerships with sponsors. So we're very accustomed to this mode where we work arm in arm, if you will, with our partners.

I do appreciate your comments. We listened. I listened. And I heard a trend in several of your concerns. So we will go back now and look at that and continue to evaluate our project management plans and some of the technical aspects of our plan as we move forward.

Again our commitment is -- my eyes are focused on that objective, the final objective,

remediating just as quickly as possible. Again thank you for your attendance. Have a good evening.

(Whereupon, the hearing was concluded at 8:45 P.M.)

STATE OF MISSOURI)
COUNTY OF ST. LOUIS)

I, Sandra L. Ragsdale, a Notary Public in and for the State of Missouri, do hereby certify that I caused to be reported in shorthand and thereafter transcribed the foregoing transcript of proceedings.

I further certify that the foregoing is a true, accurate and complete transcript of my shorthand notes so taken as aforesaid, and further, that I am not counsel for, nor in any way related to, any of the participants in this proceeding, nor am I in any way interested in the outcome thereof.

Witness my signature this 23rd day of MARCH, 1998. My Commission expires 7-20-2000.

Sandra L. Ragsdale

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