UNITED STATES
ATOMIC ENERGY COMMISSION
Post Office Box 470
St. Charles, Missouri 63301

SR:FIELD

SEP 11 1967

40-8035

Mr. W. C. Fralick, Attorney
Western Department
The Hartford Insurance Group
Hartford Plaza, Chicago, Illinois 60606

Subject: PERFORMANCE BOND NO. 3735238 - AEC CONTRACT NO. AT-(23-2)-56

Dear Mr. Fralick:

This is to advise that the performance of the work required under AEC Contract No. AT-(23-2)-56, dated February 25, 1966, with Continental Mining and Milling Company, such performance having been guaranteed by you under your Performance Bond, dated February 28, 1966, in the amount of $50,000.00, has been completed and finally accepted by the Atomic Energy Commission, acting for and on behalf of the United States of America.

Very truly yours,

F. H. Belcher
Site Representative

cc: Mr. Fay A. Peck
Claim Supervisor
St. Louis Regional Office
The Hartford Insurance Group

bcc: Mr. D. L. Oakley, Jr., OROO

NPL-V10-2-11

National Priorities List

Superfund hazardous waste site listed under the
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended in 1986

WESTLAKE LANDFILL
Bridgeton, Missouri

Westlake Landfill covers 200 acres in Bridgeton, St. Louis County, Missouri, about 16 miles northwest of downtown St. Louis. The area is adjacent to prime agricultural land and is in the floodplain of the Missouri River. Between 1939 and the spring of 1987, limestone was quarried on the site. Starting in 1962, portions of the property were used for landfilling of solid and liquid industrial wastes, municipal refuse, and construction debris. In 1973, Cotter Corp. disposed of over 43,000 tons of uranium ore processing residues and soil in two areas covering a total of 16 acres of the Westlake Landfill, according to a Nuclear Regulatory Commission (NRC) report published in 1977.

In 1976, the Missouri Department of Natural Resources (MDNR) closed the unregulated landfill. Since then, MDNR has issued several permits for various portions of the 200-acre site. Currently, an operating sanitary landfill has a permitted area of 52 areas, and an operating demolition landfill has a permitted area of 22 acres.

Uranium was detected in on-site monitoring wells in tests conducted in 1985 and 1986 by a consultant to the owner of the landfill. An estimated 60 people obtain drinking water from private wells within 3 miles of the site.

B/20

Facility name: Westlake Landfill

Location: Bridgeton, Missouri

EPA Region: VII

Person(s) in charge of the facility: Francis Baldwin*

13570 St. Charles Rock Road

Bridgeton, Missouri

Name of Reviewer: John Madras Date: February 8, 1989

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

The Westlake Landfill has been an active landfill for over two decades. It is located on the Missouri River Flood plain in St. Louis County, Missouri. In addition to accepting sanitary refuse, it has also accepted wastes from chemical production facilities and uranium processing facility. Due to the observed release of uranium , the route of major concern is the groundwater route. The aquifer of concern is used as a drinking water supply for some local residents. Chemical and radiological data from water were used to score the site. This is a state lead site.

Scores: $S_{gw} = 51.02$ $S_{sw} = 8.00$ $S_a =$ NS $S_{fe} =$ NS $S_{pc} =$ NS

NS=Not scored

FIGURE 1
HRS COVER SHEET

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*Francis Baldwin is the registered agent for the owner and operator of Westlake Landfill.

Quality Assured
August 2, 1989
Dr. Wilbur A. Stanley Jr.

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistance	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)	1	8	8	
Total Waste Characteristics Score			26	26	
5 Targets					3.5
Ground Water Use	0 1 2 (3)	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 (16) 18 20 / 24 30 32 35 40	1	16	40	
Total Targets Score			25	49	
6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5			29250	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} = 51.02			

FIGURE 2
GROUND WATER ROUTE WORK SHEET

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Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 (2) 3	1	2	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3	1	2	3	
Distance to Nearest Surface Water	0 1 (2) 3	2	4	6	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			11	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)	1	8	8	
Total Waste Characteristics Score			26	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	(0) 4 8 8 10 / 12 16 16 20 / 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5			5148	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{sw} = 8.00			

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FIGURE 7
SURFACE WATER ROUTE WORK SHEET

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Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
[1] Observed Release	0 45	1		45	5.1
Date and Location:					
Sampling Protocol:					
If line [1] is 0, the S_a = 0. Enter on line [5]. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score				20	
[3] Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
Total Targets Score				39	
[4] Multiply [1] x [2] x [3]				35,100	
[5] Divide line [4] by 35,100 and multiply by 100		S_a =			

FIGURE 9
AIR ROUTE WORK SHEET

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	S	S^2
Groundwater Route Score (S_{gw})	51.02	2603.04
Surface Water Route Score (S_{sw})	8.00	64.00
Air Route Score (S_a)	———	———
$S_{gw}^2 + S_{sw}^2 + S_a^2$		2667.04
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		51.64
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		29.85

NAC 9/7/89

FIGURE 10
WORKSHEET FOR COMPUTING S_M

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Not Scored

Fire and Explosion Work Sheet						
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)	
1 Containment	1 3	1		3	7.1	
2 Waste Characteristics					7.2	
Direct Evidence	0 3	1		3		
Ignitability	0 1 2 3	1		3		
Reactivity	0 1 2 3	1		3		
Incompatibility	0 1 2 3	1		3		
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8		
Total Waste Characteristics Score				20		
3 Targets					7.3	
Distance to Nearest Population	0 1 2 3 4 5	1		5		
Distance to Nearest Building	0 1 2 3	1		3		
Distance to Sensitive Environment	0 1 2 3	1		3		
Land Use	0 1 2 3	1		3		
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5		
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5		
Total Targets Score				24		
4 Multiply 1 x 2 x 3				1,440		
5 Divide line 4 by 1,440 and multiply by 100		S_{FE} = N.S.				

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

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EWG

Not Scored

Direct Contact Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Incident	0 45	1		45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 3	1		3	8.2
3 Containment	0 15	1		15	8.3
4 Waste Characteristics Toxicity	0 1 2 3	5		15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	0 1 2 3 4 5	4		20	
Distance to a Critical Habitat	0 1 2 3	4		12	
Total Targets Score				32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				21,600	
7 Divide line 6 by 21,600 and multiply by 100		S_{OC} =			

FIGURE 12
DIRECT CONTACT WORK SHEET

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DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference.

FACILITY NAME: Westlake Landfill

LOCATION: 13570 St. Charles Rock Road, Bridgeton
St. Louis County, Missouri

DATE SCORED: July 17, 1989 (Revised)

PERSON SCORING: John Madras

PRIMARY SOURCE(S) OF INFORMATION (e.g., EPA region, state, FIT, etc.):

Missouri Department of Natural Resources (MDNR) Files
Nuclear Regulatory Commission reports
USGS Documents

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:

Air Route
Direct Contact
Fire & Explosion

COMMENTS OR QUALIFICATIONS:

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WAG

GROUND WATER ROUTE

1. OBSERVED RELEASE

Contaminants Detected (5 maximum):

Uranium in monitoring wells S-53, I-56, I-58, I-59, S-60, I-62, I-67, S-75, D-81, S-82, I-83, S-84, S-85, D-92, and D-93 (Reference 10, Appendix E)

Groundwater flow is generally to the northwest (Reference 10 page III-6 to 7) Well I-73 is located to the east of the facility and was chosen to represent background conditions. However it contains low level radiation which most likely originated from the site.

Further background wells were identified in the Burns & McDonnell hydrogeologic investigation report as wells D-89, S-53, S-52, S-51, D-90, S-80, I-50 and D-91. (Reference 10, page III-22 to 23) Contaminants were absent from all of these wells except S-80, I-73 and S-53. A review of Reference 10 indicated that wells S-51, S-52 and S-53 may not represent background all of the time, and that more water level readings were needed to determine if wells D-91 and I-50 (which are adjacent to well S-80) are outside of the area of influence of the landfill. (Reference 17)

The detection limit was 0.4 pCi/l for uranium (Reference 16). The Oak Ridge Associated Universities participates in rigorous quality assurance programs.

Score = 45 for Observed Release (Reference 5, page 9)

Rationale for attributing the contaminants to the facility:

Uranium ore processing residues are known to have been deposited in the landfill. (Reference 15, page 4) Groundwater monitoring in and around the landfill has established that radioactive material has entered the groundwater and that the contamination has reached perimeter wells. (Reference 1, page 11) No other source of the contaminant is located in the vicinity of the landfill. The contaminant was not detected in background wells except as noted above.

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WESTLAKE QUARRY LANDFILL

OBSERVED RELEASE DATA

Compound	Release/ Background	Well Number	Well Depth (feet)	Observed Concentration (PCi/l)
Uranium[1]	Release	S-53	23.7	22.0[2]
	Release	I-56	61.1	8.9
	Release	I-58	60.0	13.0
	Release	S-60	21.0	19.0
	Release	I-67	35.4	7.4
	Release	S-75	26.0	16.0
	Release	D-81	61.5	4.9
	Release	S-82	26.5	13.0
	Release	S-84	31.5	9.0
	Release	D-92	143.6	17.0
	Release	D-93	115.2	6.0
	Background	I-73	50.0	3.0

Underlined values represent significant observed releases of uranium.

[1] Sampling for uranium was conducted from May 7, 1986 through May 8, 1986. (Reference 10, pager II-7)

[2] The detection limit for uramium was 0.4 pCi/l. (Reference 16)

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Dr. W. A. Cantrell

2. ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifer(s) of concern:

The aquifer of concern is the Missouri River alluvium which consists of clay, silt and gravel. The alluvium includes thick deposits of glacial outwash and some river terrace deposits, and fills the deeply eroded bedrock channel formed by the Missouri River (Reference 10, page I-2). In general, the alluvium becomes coarser-grained with depth. (Reference 10, page I-3) The deep Missouri River alluvium, which is under about ten feet of more recent alluvium, acts as a single aquifer of very high permeability. This aquifer is relatively homogeneous in a downstream direction and decreases in permeability near the valley walls. A profile of the aquifer is presented in Reference 10 (page I-6). The depth of the aquifer increases from edge of the buried valley wall toward the Missouri River. It is 28 feet deep at well D-89 which is near the buried valley wall and increases to 110 feet at the riverward well D-83. Well logs show no discontinuities in the alluvial aquifer. (Reference 10) The groundwater of this aquifer flows generally to the northwest. (Reference 10, page III-6 to 7) The base of the limestone aquifer is formed by the relatively impermeable Warsaw shale. The Warsaw shale acts as an aquiclude. (Reference 1, page 6)

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

Depth from the ground surface to the lowest point of waste disposal/storage:

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Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

Mean annual lake or seasonal evaporation (list months for seasonal):

Net precipitation (subtract the above figures):

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Permeability associated with soil type:

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

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3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Method with highest score:

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Uranium. Uranium is known to have been deposited at this site.

Compound with highest score:

Uranium.

Score = 18 For Toxicity/Persistence (Reference 5, page 18; Reference 6, page 3445)

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

The original amount of radioactive material was 3700 tons of barium sulfate sludge containing 7 tons of uranium ore processing waste. This was mixed with 39,000 tons of soil before being deposited in the landfill. (Reference 15, page 4) The material had been stored by Cotter Corporation under Nuclear Regulatory Commission license at 9200 Latty Avenue, Hazelwood, Missouri. This waste was originally reported to have been disposed at St. Louis County sanitary landfill area No. 1 (Reference 15, page 2) A subsequent NRC investigation clarified that a total of over 43,000 tons of waste were removed from the Latty Avenue site and that htis material was dumped at the Westlake Landfill. (Reference 15, page 3)

Score = 8 for Hazardous Waste Quantity (Reference 5, page 19)

Basis of estimating and/or computing waste quantity:

The amount of radioactive material was known at the time of disposal, as described above. (Reference 15, page 4)

***

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5. TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

There are at least fifteen known private drinking water wells within three miles of the facility. Groundwater is being used as a drinking water source, for other domestic purposes and for irrigation. (Reference 1, page 6; Reference 7, map; Reference 12; Reference 13; Reference 20)

No municipal water from alternative unthreatened sources is presently available to these users. (Reference 14)

Score = 3 for Ground Water Use (Reference 5, page 24)

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

The nearest well is about 2500 feet from the facility. (Reference 20) Seventeen additional wells are within three miles of the facility. (Reference 7, map; Reference 12; Reference 13)

Distance to above well or building:

The nearest well is about 2500 feet from the facility. (Reference 20, map; Reference 9, map showing distance)

Score = 3 for Distance to Nearest Well (Reference 5, page 26)

Population Served by Groundwater Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

At least fifteen wells provide drinking water. (Reference 12 identifies eleven homes and two businesses; Reference 7 shows two additional wells not documented in Reference 12) The human population estimated to be served is at least 57. (Homes and businesses identified by References 7 and 12 times 3.8)

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Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

At least 480 acres of cropland (rowcrops and produce) are irrigated from wells within the three mile radius. (Reference 13) The population equivalent is 720 people.

Total population served by groundwater within a 3-mile radius:

The population served by groundwater is at least 777.

Score = 2 for Population Served (Reference 5, page 27)

Score = 16 for Distance to Nearest Well/Population Served (Reference 5, page 25)

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SURFACE WATER ROUTE

1. OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

None.

Score = 0 for Observed Release (Reference 5, page 29)

Rationale for attributing the contaminants to the facility:

Surface water was not sampled.

***

2. ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

Radioactive gases have been detected in the atmosphere above the landfill. (Reference 3, page 17) Buried deposits extend in excess of 20 feet in depth from the highest point of detection. They are also present on the surface of the sideslope of the landfill where they are available for migration by overland flow. (Reference 3, page 42) The slope from the top of the landfill to the location where the subsurface radioactive deposit intersects the sideslope is about 20%. The top of the landfill slopes less than 1 percent. (Reference 10, page I-6)

Name/description of nearest downslope surface water:

An unnamed, permanently flowing tributary to the Missouri River drains the site. The tributary is located about 1000 feet west of the landfill. (Reference 9)

Average slope of terrain between facility and above-cited surface water body in percent:

The landfill slopes directly to drainage ditches, which discharge to the tributary. Average slope between lowest point of documented contamination on the landfill sideslope (elevation 460 feet) and the tributary is about 4 percent. The elevation of the surface water was determined to be 440 feet. (Reference 3, page 42; Reference 9; Reference 10, page I-6)

Score = 2 for Facility Slope and Intervening Terrain (Reference 5, page 31)

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Is the facility located either totally or partially in surface water?

No. (Reference 9)

Is the facility completely surrounded by areas of higher elevation?

No. (Reference 9)

1-Year 24-Hour Rainfall in Inches

2.9" (Refeence 5, page 33)

Score = 2 for 1-Year 24-Hour Rainfall (Reference 5, page 32)

Distance to Nearest Downslope Surface Water

The landfill is about 1000 feet from the tributary and about 1.25 miles from the Missouri River. (Reference 9)

Score = 2 for Distance to Nearest Downslope Surface Water (Reference 5, page 32)

Physical State of Waste

Radioactive gases have been detected above the landfill surface. (Reference 3, page 17) The buried radioactive material intersects the surface of the ladfill sideslope. (Reference 3, page 47) Radon is water soluble and is available to wash into surface waters from the landfill. (Reference 1, page 10)

Score = 3 for Physical State of Waste (Reference 5, page 16)

***

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Some of the radioactive contaminated soil is at or near the surface of the landfill. (Reference 1, page 5)

Method with highest score:

Landfill not covered and no diversion system present.

Score = 3 for Containment (Reference 5, page 35)

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4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Uranium. Uranium is known to have been deposited at this site, and has been detected on the surface of the sideslope of the landfill (Reference 3, page 42).

Compound with highest score:

Uranium.

Score = 18 for Toxicity/Persistence (Reference 5, page 18; Reference 6, page 3445)

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

The original amount of radioactive material was 8700 tons of barium sulfate sludge containing 7 tons of uranium ore processing waste. This was mixed with 39,000 tons of soil before being deposited in the landfill. (Reference 15, page 4) The material had been stored by Cotter Corporation under Nuclear Regulatory Commission license at 9200 Latty Avenue, Hazelwood, Missouri. This waste was originally reported to have been disposed at St. Louis County sanitary landfill area No. 1 (Reference 15, page 2) A subsequent NRC investigation clarified that a total of over 43,000 tons of waste were removed from the Latty Avenue site and that htis material was dumped at the Westlake Landfill. (Reference 15, page 3)

Score = 8 for Hazardous Waste Quantity (Reference 5, page 19)

Basis of estimating and/or computing waste quantity:

The amount of radioactive material was known at the time of disposal, as described above. (Reference 15, page 4)

***

5. TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

The Missouri River has state-designated beneficial uses of irrigation, livestock and wildlife watering, protection of aquatic life, commercial fishing, boating, and drinking water, and industrial water supplies. (Reference 4, page 57) No beneficial uses are specifically designated for

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the permanently flowing tributary of the Missouri River that drains the landfill area. (Reference 4) No water supply intake is located within 3 miles downstream of the hazardous substance.

Score = 2 for Surface Water Use (Reference 5, page 34)

Is there tidal influence?

No. (Reference 9)

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

NA (Reference 9)

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Areas of freshwater wetlands may be present within one mile of the facility. (Reference 9)

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

NA

Score = 0 for Distance to a Sensitive Environment (Reference 5, page 37)

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

None.

Score = 0 for Population Served/Distance to Water Intake Downstream (Reference 5, page 38)

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Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

There is no known irrigation from the permanently flowing stream which drains the landfill area.

Total population served:

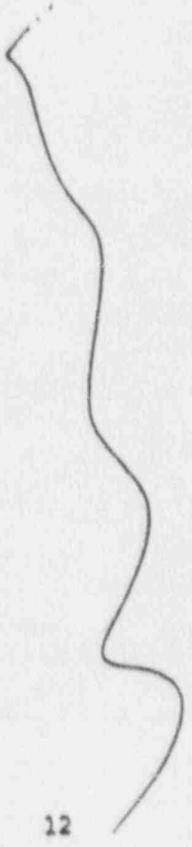
NA

Name/description of nearest of above water bodies:

NA

Distance to above-cited intakes, measured in stream miles.

NA



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AIR ROUTE

Not Scored

1. OBSERVED RELEASE

Contaminants detected:

Date and location of detection of contaminants

Methods used to detect the contaminants:

Rationale for attributing the contaminants to the site:

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2. WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Most incompatible pair of compounds:

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8/2/89
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Toxicity

Most toxic compound:

Hazardous Waste Quantity

Total quantity of hazardous waste:

Basis of estimating and/or computing waste quantity:

* * *

3. TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi 0 to 1 mi 0 to 1/2 mi 0 to 1/4 mi

Distance to a Sensitive Environment

Distance tc 5-acre (minimum) coastal wetland, if 2 miles or less:

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

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Distance to critical habitat of an endangered species, if 1 mile or less:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

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FIRE AND EXPLOSION

Not Scored

A score for the fire and explosion hazard mode has not been computed. Neither a state or local fire marshal has certified that the facility presents a significant fire or explosion threat to the public or to sensitive environments. Field observations have not demonstrated a fire or explosion threat.

1. CONTAINMENT

Hazardous substances present:

Type of containment, if applicable:

* * *

2. WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

Ignitability

Compound used:

Reactivity

Most reactive compound:

Incompatibility

Most incompatible pair of compounds:

* * *

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DIRECT CONTACT

Not Scored

1. OBSERVED INCIDENT

Date, location, and pertinent details of incident:

* * *

2. ACCESSIBILITY

Describe type of barrier(s)

* * *

3. CONTAINMENT

Type of containment, if applicable:

* * *

4. WASTE CHARACTERISTICS

Toxicity

Compounds evaluated:

Compound with highest score:

* * *

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REFERENCES

If the entire reference is not available for public review in the EPA regional files on this site, indicate where the reference may be found:

Reference Number	Description of the Reference
1.	U. S. Nuclear Regulatory Commission, Radioactive Material in the West Lake Landfill, Summary Report, NUREG-1308, Rev.1, June 1988.
2.	U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of St. Louis County and St, Louis City, Missouri, May 1982.
3.	Radiation Management Corporation, Radiological Survey of the West Lake Landfill, St. Louis County, Missouri, NUREG/CR-2722, U.S. Nuclear Regulatory Commission, May 1982.
4.	Missouri Code of State Regulations, Rules of the Clean Water Commission, Chapter 7, Water Quality Standards, 10 CSR 20-7.031.
5.	U.S. Environmental Protection Agency, Uncontrolled Hazardous Waste Site Ranking System - A User's Manual, 1984.
6.	Sax, N. Irving and Lewis, J., Sr., Dangerous Properties of Industrial Materials, Seventh Edition. Van Nostrand Reinhold, New York. 1989.
7.	Scott A. Meierotto letter to West Lake Quarry with map attachment, dated January 14, 1982.
8.	Roy D. Blunt, Missouri Secretary of State, Official Manual State of Missouri 1987-1988.
9.	U.S. Geological Survey, St. Charles, Missouri; 7.5 minute quadrangle map, revised 1974.
10.	Burns & McDonnell, Hydrogeologic Investigation West Lake Landfill Primary Phase Report, October 1986.
11.	EPA Forms 8900-1, Notification of Hazardous Waste Site, filed by various waste haulers who deposited solid waste in Westlake Landfill.
12.	Mike Struckhoff, Memo to John Madras, dated June 30, 1989.
13.	John Madras, Memo to Westlake Quarry Landfill File, dated July 14, 1989.
14.	Record of phone conversation between Dave Pruitt, St. Louis County Water Co., and John Madras, dated June 6, 1989.

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Reference Number	Description of the Reference
15.	U. S. Nuclear Regulatory Commission, IE Investigation Report No. 76-01, dated January 5, 1977.
16.	Record of phone conversation between Clayton Weaver, Oak Ridge Associated Universities and John Madras, dated July 18, 1989.
17.	Janese Neher, Memo to Miles H. Stotts, dated June 16, 1989.
18.	Division of Geology and Land Survey, Well Logs of the Missouri River Floodplain of St. Louis County north of Route 115.
19.	Record of phone conversation between John Meadows and Lynn Hartman, and John Madras dated July 26, 1989.
20.	Record of phone conversation between Mike Struckhoff and John Madras, dated July 26, 1989.

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Mr. Burt McCullough
Missouri Department of
Natural Resources
P. O. Box 1368
1915 Southridge Drive
Jefferson City, Missouri 65102

Dear Mr. McCullough:

In response to your letter of December 18, 1980, we have carefully researched the information that the Department has on the West Lake Landfill in St. Louis County and determined that we have nothing to add to the information you received from Mr. E. L. Keller (Department of Energy - Oak Ridge Operations Office) at the December 9, 1980, meeting. The Department does not have plans for future activities at the West Lake Landfill. The radioactive material deposited at the Landfill was under license by the Nuclear Regulatory Commission and therefore is under their jurisdiction. The afore, I have forwarded your request for information to the Division of Fuel Cycle and Material Safety, Nuclear Regulatory Commission.

If I can be of any further assistance to you, contact me on 301-353-3016 or Gale Turi of my staff on 301-353-2766.

Sincerely,

William E. Mott, Director
Environmental and Safety
Engineering Division
Office of Environment (EV-14)

Enclosure
Ltr. to Cunningham from Mott, dtd. 1/28/81

bcc: E. L. Keller, OR
R. W. Ramsey, NE-301
Aerospace

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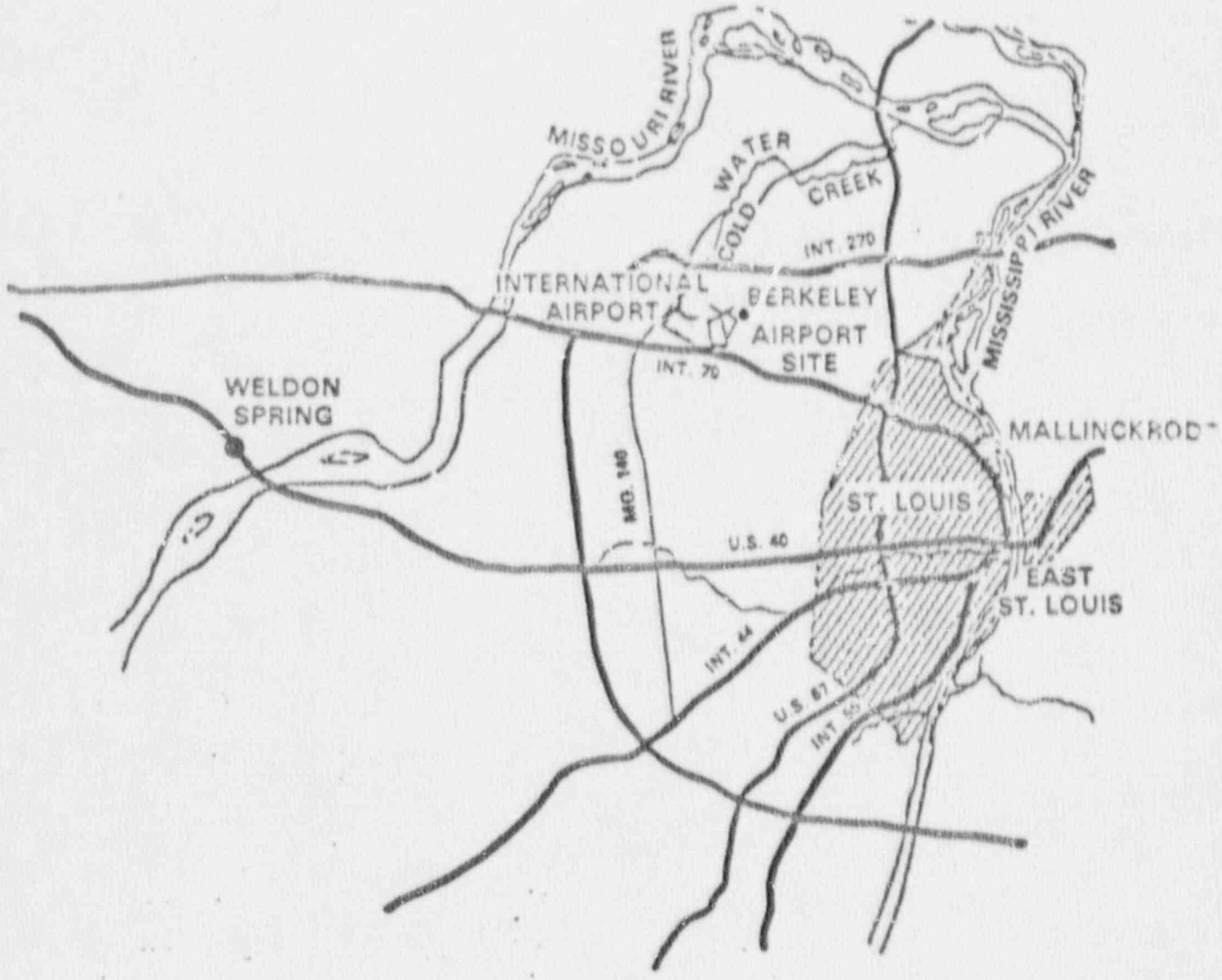

Figure 18. Location of Mallinckrodt Property

Site Function

The site was used as a storage area for waste generated by the Mallinckrodt Chemical Corporation during its uranium processing operations from 1946 to 1953. This waste or residue was stored at the site until 1967.

Site Description

The storage site is a 21.7-acre tract of land in St. Louis County, bordered on the north and east by Brown Road, on the south by the Norfolk and Western Railroad and the Airport, and on the west by Coldwater Creek.

Owner History

This site was acquired by the Manhattan Engineer District in 1946. Since 1965, access to the site has been controlled by the Airport Manager, thus barring casual entry. A permit, dated November 10, 1969, authorized the St. Louis Airport Authority to enter upon, use, and occupy the site for the purpose of undertaking certain decontamination work. The city of St. Louis Airport Authority acquired this site from the Atomic Energy Commission through General Services Administration (GSA) transfer (deed GS-06-DR-(5)-9-0085), effective June 8, 1973. The deed contains a restriction on the use of the property because residual radioactive materials remain onsite.

Radiological History and Status

The Atomic Energy Commission conducted a radiation survey of the Airport Site in 1965. Contamination was found on structures and at various locations and depths within the soil. During 1966 and 1967, residues were sold for processing and removed from the site. The removal of the residue resulted in decontamination of the site, restoring it to a condition where the radiation level at the ground surface was less than 1 mrad/hour except for an area where barium sulfate residue was located. This area was about 3 mrad/hour.

The St. Louis Airport Authority agreed to decontaminate this property as stated in the acquisition permit, dated November 10, 1969. An agreement with the Federal Government required that the barium sulfate residue be removed to an interim storage site at Weldon Spring, Missouri, and that all structures onsite except the fence be razed. Also, a minimum of 1 foot of clean fill was to be placed over the entire site. This work was performed during the period from January 1969 through December 1969 under procedures developed and monitored by the St. Louis Health Department as approved by the Atomic Energy Commission.

[illegible] at 11 points [illegible] area to achieve acceptable [illegible].

The Atomic Energy Commission conducted another radiation survey in November 1971 to document radiation levels over the entire site. Ground surface dose rates were generally less than 0.05 mrad/hour. Certain isolated areas were found to exceed 0.2 mrad/hour and were documented. No area was found to exceed 1 mrad/hour.

During the week of November 14, 1976, Oak Ridge National Laboratory performed a comprehensive survey of the site to characterize the existing radiological status of the property. The survey report indicated that the contaminated soil in the western section of the site represents a potential source of radiation exposure. At the time when some of the stored material was sold and removed, some remaining barium sulfate cake residue was covered with fill. At the present time, most of the contamination remains covered with earth in varying thicknesses; however, this earth cover has eroded up to 3 feet in some places. In one small area of the western section, above-background readings were obtained in numerous places. Samples of soil were collected from various points within the site and, at 26 points, a concentration of radium-226 was found to be in excess of the maximum level for background concentrations observed in Missouri. An analysis of groundwater revealed measurable quantities of several nuclides. Radionuclide analysis of surface water and sediment samples showed levels near background in most cases.

The St. Louis Police Department is planning to develop this site for use as a driver training course, with due consideration to the restrictions in the deed. The Nuclear Regulatory Commission has also proposed that contaminated material from the formerly licensed Latty Avenue* property located in Hazelwood, Missouri, be relocated to the airport site. The Department of Energy is evaluating the environmental and engineering impacts of this proposal.

On October 26, 1979, the Office of Environment notified the Office of Nuclear Energy that the St. Louis Airport site required consideration for remedial action. The Office of Nuclear Energy is currently in the process of determining and reviewing remedial action options.

* Latty Avenue is a former uranium processing site that is under the jurisdiction of the Nuclear Regulatory Commission.

Site Function

The Department of Energy's Weldon Spring site consists of two separate properties. One of these properties is the raffinate pit area, which contains four pits constructed and used for the storage of wastes generated from the adjacent Atomic Energy Commission Uranium Feed Materials Plant (the plant area is now controlled by the U.S. Army). Mallinckrodt, Inc., operated this plant for the Atomic Energy Commission from 1957 until 1966. Some processing of thorium residues was also performed at the plant. The other property is an abandoned quarry located approximately 4 miles southwest of the raffinate pit area. The quarry was first used by the Atomic Energy Commission in 1959 when drummed residues containing about 3.8 percent thorium were dumped there. In 1963 to 1964, approximately 50,000 cubic yards of uranium- and radium-contaminated rubble from the demolition of the Destrehan Street plant were deposited in the quarry. Additional drummed thorium residues containing about 3 percent thorium were deposited in the quarry in 1966. During the decontamination of several of the buildings selected for herbicide production in 1967, the Army deposited approximately 6000 cubic yards of contaminated and unrecoverable material in the quarry. (The herbicide production proposal was later put aside.) Prior to the Atomic Energy Commission, the Army also used the quarry for disposition of trinitrotoluol-contaminated rubble during the operation of the Weldon Spring Ordnance Works Plant.

Site Description

The raffinate pit area occupies approximately 51 acres and is totally surrounded by Army property. Pits 1 and 2 are filled with residues within 3 feet of the top of the levees and Pit 3 is approximately 78-percent filled with residues. The residue fill in Pit 4 is quite irregular with about 10 percent of the total pit volume consumed. Approximately 70 percent of the residues discharged to Pits 1, 2, and 3 were neutralized raffinates from refinery operations. The remaining 30 percent of the residues consisted primarily of washed slag residues from the uranium metal production operation. In addition to some uranium residues similar to those in Pits 1, 2, and 3, Pit 4 contains raffinate solids from the processing of thorium recycle materials. Some minor amounts of thorium are also present in Pit 3. The raffinate pit area is fenced with standard 7-foot chain-link cyclone fence topped with three strands of barbed wire. Access to the pits is obtainable solely through the road system and security gates of the Army-owned areas.

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* This site is a DOE-owned Surplus Facility. It is included in this report because it was formerly utilized by the Atomic Energy Commission for processing activities.

location. [illegible] 1/2 acre consisting of a pond or sump. The quarry is fenced with a 7-[illegible] cyclone fence similar to the raffinate pit area, and signs are clearly posted indicating the presence of radiological material. The general location of Weldon Spring with respect to other Missouri sites is shown in Figures 18 and 19.

Owner History

In 1956, approximately 220 acres of the original Weldon Spring Ordnance Works Plant were acquired by the Atomic Energy Commission from the U.S. Army for use as a uranium feed materials plant. The Atomic Energy Commission acquired the abandoned quarry in 1958, also from the Army. After the Feed Materials Plant was shut down in 1966, the Army reacquired the land and facilities, except for the 51-acre raffinate pit area and the quarry, to use portions of the plant facilities for the production of herbicide orange. However, the project was never implemented and the property was declared excess in 1970. The General Services Administration determined that the land could not be released because of the degree of radioactive contamination. Both the raffinate pit area and the quarry are under the control of the Department of Energy, but the remainder of the property is still under Army control.

Radiological History and Status

Since about 1967, the National Lead Company of Ohio, under contract with Oak Ridge Operations Office, makes periodic visits to the raffinate pit area for environmental control sampling. Necessary security and maintenance such as fence repair and grass-cutting is performed, under agreement, by the Army personnel located onsite. The pits are uncovered and represent a potential quicksand hazard; however, access is restricted by the 7-foot fence and the area is completely enclosed within the boundary of a U.S. Army facility. Beta-gamma radiation measurements at a point about 1 foot above the sludge were above background. Air samples taken around the pits have shown no short- or long-lived airborne activity that could be attributed to the pits. Test holes drilled in the area have shown neither lateral seepage of effluents nor selective migration of radionuclides from the raffinate pits. Data obtained from the analyses of samples of effluents and storm drainage from the pit area indicate that uranium and other radiological contaminate concentrations are within Nuclear Regulatory Commission concentration guides for uncontrolled areas.*

The Department of Energy is currently negotiating with the Cotter Corporation of Canon City, Colorado, for the removal of the raffinates from the pits. An Environmental Assessment, DOE/EA-0031, has been prepared

* Title 10, Code of Federal Regulations, Part 20, Standards for Protection Against Radiation.

the [illegible]
. . Department [illegible]
raffinates and pits.

Data obtained from [illegible] National Lead of Ohio at the quarry in 1975 and 1976 indicate that uranium and thorium concentrations in the quarry pond are above background but within Federal guidelines for water in controlled areas.* Water in the Femme Osage Slough, although at lower levels, is also above background, and this appears to confirm the existence of a hydraulic connection between the quarry and the Slough. Samples of incoming water to the St. Charles waterworks well field indicate that no contamination of the well field exists; however, due to the proximity of the well field to the quarry and the Femme Osage Slough, contamination could be a matter of potential concern.

Some form of remedial action is required at this site. Removal of the raffinate from the pits (possibly by Cotter Corporation for reprocessing) is required and may be followed by decontamination of the pits themselves. The disposition of the quarry must also be addressed. Meanwhile, monitoring of the site will continue, and a radiometric aerial survey is planned for fiscal year 1980.

The Department of the Army has requested that the Department of Energy accept the transfer of the 169-acre Weldon Spring Chemical Plant as they have neither the funds nor the expertise to decontaminate the property. The Department of Energy is evaluating the proposal along with other options.

* Title 10, Code of Federal Regulations, Part 20, Standards for Protection Against Radiation.

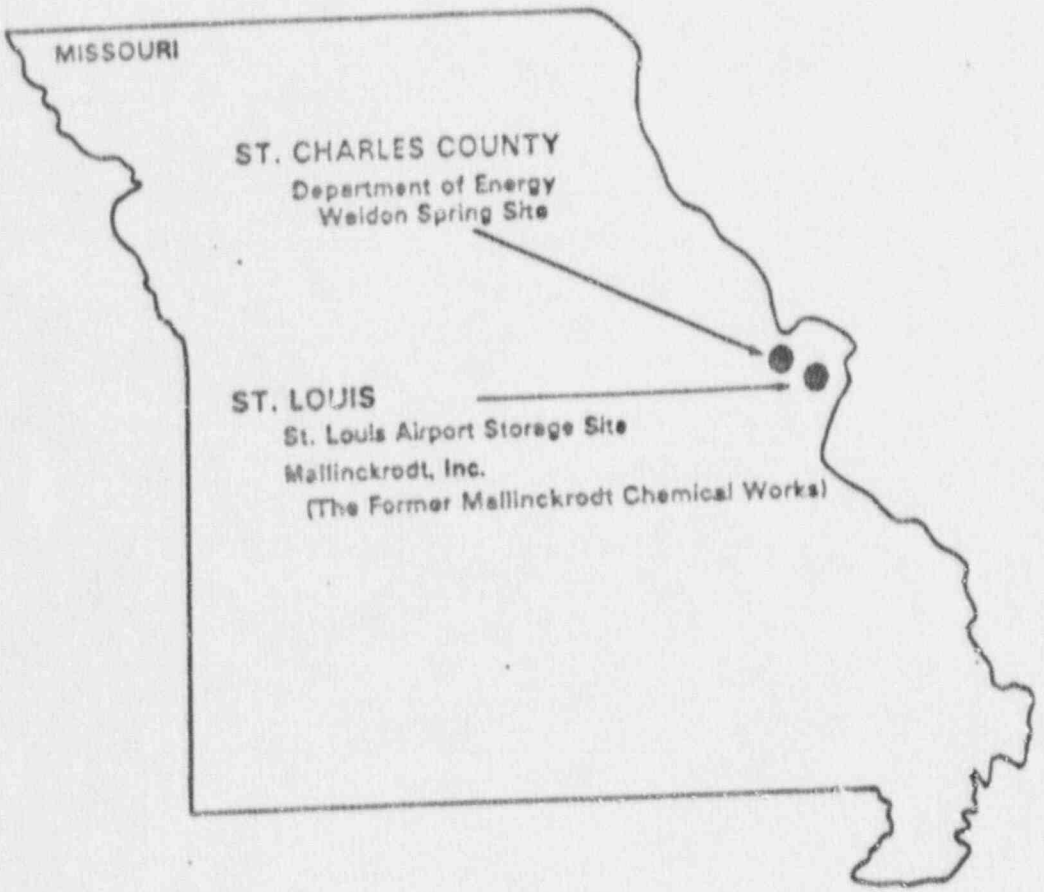

Figure 19. Formerly Utilized Sites in the State of Missouri

open to all types, kinds, and classes of aeronautical use without discrimination between such types, kinds and classes. Provided, that the grantee may establish such fair, equal, and not unjustly discriminatory conditions to be met by all users of the airport as may be necessary for the safe and efficient operation of the airport; and provided, further, that the grantee may prohibit or limit any given type, kind or class of aeronautical use of the airport if such action is necessary for the safe operation of the airport or necessary to serve the civil aviation needs of the public. (2) That in its operation and the operation of facilities on the airport, neither it nor any person or organization occupying space or facilities thereupon will discriminate against any person or class of persons by reason of race, color, creed, or national origin in the use of any of the facilities provided for the public on the airport. (3) That in any agreement, contract, lease, or other arrangement under which a right or privilege at the airport is granted to any person, firm or corporation to conduct or engage in any aeronautical activity for furnishing services to the public at the airport, the grantee will insert and enforce provisions requiring the contractor: (a) to furnish said service on a fair, equal and not unjustly discriminatory basis to all users thereof, and (b) to charge fair, reasonable and not unjustly discriminatory prices for each unit of service, provided, that the contractor may be allowed to make reasonable and nondiscriminatory discounts, rebates, or other similar types of price reductions to volume purchasers. (4) That the grantee will not exercise or grant any right or privilege which would operate to prevent any person, firm, or corporation operating aircraft on the airport from performing any services on its own aircraft with its own employees (including, but not limited to maintenance and repair) that it may choose to perform. (5) That in the event the grantee itself exercises any of the rights and privileges referred to in subsection (3) above the services involved will be provided on the same conditions as would apply to the furnishing of such services by contractors or concessionaires of the grantee under the provisions of such subsection (3) of this paragraph 7 B.

C. The grantee will not grant or permit any exclusive right for the use of the airport at which the property described herein is located which is forbidden by Section 308 of the Federal Aviation Act of 1958, as amended, by any person or persons to the exclusion of others in the same class and will otherwise comply with all applicable laws. In furtherance of this covenant (but without limiting its general applicability and effect), the grantee, specifically agrees that, unless authorized by the Administrator, it will not either directly or indirectly, grant or permit any person, firm or corporation the exclusive right to conduct any aeronautical activity on the airport including but not limited to, charter flights, pilot training, aircraft rental and sightseeing, aerial photography, crop dusting, aerial advertising and surveying, air carrier operations, aircraft sales, and services, sale of aviation petroleum products whether or not conducted in conjunction with other aeronautical activity, repair and maintenance of aircraft, sale of aircraft parts, and any other activities which because of their direct relationship to the operation of aircraft can be regarded as an aeronautical activity. The grantee further agrees that it will terminate as soon as possible and no later than the earliest renewal, cancellation, or expiration date applicable thereto, any exclusive right existing at any airport owned or controlled by the grantee and that, thereafter, no such right shall be granted. However, nothing contained herein shall be construed to prohibit the granting or exercise of exclusive right for the furnishing of nonaviation products and supplies or any service of a nonaeronautical nature or to obligate the grantee to furnish any particular nonaeronautical service at the airport.

D. The grantee shall, insofar as it is within its powers and to the extent reasonable, adequately clear and protect the aerial approach to the airport. The grantee will, either by the acquisition and retention of easements or other interests in or rights for the use of land airspace or by the adoption and enforcement of zoning regulations, prevent the construction, erection, alteration, or growth of any structure, tree, or other object in the approach areas of the runways of the Airport which would constitute an obstruction to air navigation according to the criteria or standards prescribed in Part 77 of the Federal Aviation Regulations, as applicable, according to the currently approved airport layout plan. In addition, the grantee will not erect or permit the erection of any permanent structure or facility which would interfere materially with the use, operation, or future development of the Airport, in any portion of a runway approach area in which the grantee has acquired, or may hereafter acquire, property interest permitting it to so control the use made of the surface of the

land. Insofar as is within its power and to the extent reasonable the grantee will take action to restrict the use of the land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations including landing and take-off of aircraft.

E. The grantee will operate and maintain in a safe and serviceable condition, as deemed reasonably necessary by the Administrator of the FAA, the airport and all facilities thereon and connected therewith which are necessary to service the aeronautical users of the airport other than facilities owned or controlled by the United States and will not permit any activity thereon which would interfere with its use for airport purposes: Provided, that nothing contained herein shall be construed to require that the airport be operated for aeronautical uses during temporary periods when snow, flood, or other climatic conditions interfere with such operation and maintenance, repair, restoration or replacement of any structure or facility which is substantially damaged or destroyed due to an act of God or other condition or circumstance beyond the control of the grantee.

F. That the grantee will make available all facilities of the airport at which the property described herein is located or developed with Federal aid and all those usable for the landing and taking off of aircraft to the United States at all times, without charge, for use by aircraft of any Agency of the United States in common with other aircraft, except that if the use by aircraft of any Agency of the United States in common with other aircraft is substantial, a reasonable share, proportional to such use, of the cost of operating and maintaining facilities so used, may be charged; and unless otherwise determined by the FAA, or otherwise agreed to by the grantee and the using Federal Agency, substantial use of an airport by United States aircraft will be considered to exist when operations of such aircraft are in excess of those which, in the opinion of the FAA, would unduly interfere with use of the landing area by other authorized aircraft or during any calendar month that (1) [illegible] five (5) or more aircraft of any Agency of the United States are regularly based at the airport or on land adjacent thereto, or (2) the total number of movements (counting each landing as a movement and each take-off as a movement) of aircraft of any Agency of the United States is 300 or more, or (3) the gross accumulative weight of aircraft of any Agency of the United States using the airport (the total movements of such Federal aircraft multiplied by gross certified weights thereof) is in excess of five million pounds.

G. The grantee will not permit any structure, other than structures required for aids to air navigation and such other structures as may be specifically excepted in writing by the FAA, to be erected or remain on the land herein described and to and in which the grantor's property interest is hereby conveyed nor will it permit any use to be made of the said land which would result in or create electrical or electronic interference with electronic air navigational aids or aeronautical radio communications or smoke, lights or glare or other impairment to the vision of pilots of aircraft using the above-identified airport or which would render it difficult for such pilots to distinguish between airport lights and others, or which would create noisome odors or attract waterfowl or otherwise endanger or be hazardous to aircraft landing at, taking off from or maneuvering in the vicinity of the said airport, or permit any object of natural growth on the said land within 200 feet of an Approach Light System component to extend above the plane of the light path thereof.

H. The grantee does hereby release the Government, and will take whatever action may be required by the Administrator of the FAA to assure the complete release of the Government from any and all liability the Government may be under for restoration or other damage under any lease or other agreement covering the use by the Government of the airport, or part thereof, owned, controlled or operated by the grantee, upon which, adjacent to which, or in connection with which, any property transferred by this instrument was located or used: Provided, that no such release shall be construed as depriving the grantee of any right it may otherwise have to receive reimbursement under Section 16 of the Federal Airport Act of 1946, as amended, for the necessary rehabilitation or repair of public airports heretofore or hereafter substantially damaged by any Federal agency.

I. That whenever so requested by the FAA, grantee will furnish without cost to the Federal Government, for construction, operation and maintenance of facilities for air traffic control activities, or weather reporting activities, or communication activities related to air traffic control, such areas of the property described herein or rights in buildings on the airport at which the property described herein is located, as the FAA may consider necessary or desirable for construction at Federal expense of space or facilities for such purposes, and the grantee will make available such areas or any portion thereof for the purposes provided herein within 4 months after receipt of written request from the FAA, if such are or will be available.

J. The grantee will: (1) furnish the FAA with annual or special airport financial and operational reports as may be reasonably requested using either forms furnished by the FAA or in such manner as it elects so long as the essential data are furnished, and (2) upon reasonable request of the FAA; make available for inspection by and duly authorized representative of the FAA the airport, at which the property described herein is located, and all airport records and documents affecting the Airport, including deeds, leases, operation and use agreements, regulations, and other instruments and will furnish to the FAA a true copy of any such document which may be reasonably requested.

K. And, that the grantee will not enter into any transaction which would operate to deprive it of any of the rights and powers necessary to perform or comply with any or all of the covenants and conditions set forth herein unless by such transaction the obligation to perform or comply with all such covenants and conditions is assumed by another public agency found by the FAA to be eligible as a public agency as defined in the Federal Airport Act of 1946, as amended, to assume such obligation and have the power, authority, and financial resources to carry out all such obligations and, if an arrangement is made for management or operation of the Airport by any agency or person other than the party of the second part, it will reserve sufficient rights and authority to insure that such Airport will be operated and maintained in accordance with these covenants and conditions, any applicable Federal Statute, and the Federal Aviation regulations.

L. And, that the grantee will keep up to date at all times an airport layout map of the Airport at which the property described herein is located showing: (a) the boundaries of the Airport and all proposed additions thereto, together with the boundaries of all offsite areas owned or controlled by the grantee for airport purposes and proposed additions thereto; (b) the location and nature of all existing and proposed airport facilities and structures (such as runways, taxiways, aprons, terminal buildings, hangars, and roads), including all proposed extension and reductions of existing airport facilities; (c) the location of all existing and proposed nonaviation areas and of all existing improvements thereon and uses made thereof and such airport layout map and each amendment, revision, or modification thereof, shall be subject to the approval of the FAA, which approval shall be evidenced by the signature of a duly authorized representative of the FAA on the face of the airport layout map, and the grantee will not make or permit the making of any changes or alterations in the Airport or any of its facilities other than in conformity with the airport layout map as so approved by the FAA, if such changes or alterations might adversely affect the safety, utility, or efficiency of the Airport.

M. That if at any time it is determined by the FAA that there is any outstanding right or claim of right in or to the Airport property, described herein, the existence of which creates an undue risk of interference with the operation of the Airport or the performance of compliance with covenants and conditions set forth herein, the grantee will acquire, extinguish or modify such right or claim of right in a manner acceptable to the FAA.

N. That in the event that any of the aforesaid terms, conditions, reservations, or restrictions are not met, observed, or complied with by the grantee or any subsequent transferee, whether caused by the legal inability of said grantee or subsequent transferee to perform any of the obligations herein set out, or otherwise, the title, right of possession and all

rights transferred by this instrument to the grantee, or any portion thereof, shall at the option of the grantor revert to the grantor in its then existing condition sixty (60) days following the date upon which demand to this effect is made in writing by the Administrator of the FAA or his successor in function, unless within said sixty (60) days such default or violation shall have been cured and all such terms, conditions, reservations and restrictions shall have been met, observed, or complied with, in which event said reversion shall not occur and title, right of possession, and all other rights transferred hereby, except such, if any, as shall have previously reverted, shall remain vested in the grantee, its transferees, successors and assigns.

O. That if the construction as covenants of any of the foregoing reservations and restrictions recited herein as covenants or the application of the same as covenants in any particular instance is held invalid, the particular reservation or restrictions in question shall be construed instead merely as conditions upon the breach of which the Government may exercise its option to cause the title, interest, right of possession, and all other rights transferred to the grantee, or any portion thereof, to revert to it, and the application of such reservations or restrictions as covenants in any other instance and the construction of the remainder of such reservations and restrictions as covenants shall not be affected thereby.

P. The grantee has inspected and is fully familiar with the physical condition of the tract of land herein conveyed. The Government has made no representation, warranties, or undertakings as to such condition or that the land is free and clear of all contamination and hidden hazards, or as to the fitness or availability of the land for any particular use. The Government has transmitted to the grantee available information on radiation and contamination levels with respect to the lands herein conveyed and the grantee acknowledges the receipt of this information. The grantee recognizes that the subsurface of the tract of land herein conveyed is contaminated with source material as defined in the Atomic Energy Act of 1954, as amended, and in the Atomic Energy Commission regulations, and that future use of such tract shall be dependent upon the effectiveness of the cover and fill material in reducing external radiation to acceptable levels. The grantee hereby covenants for itself, its successors, and assigns that:

(1) There shall be no removal of earth covered by excavation, drilling, or other disturbance without prior notice to the United States Atomic Energy Commission, Washington, D. C., or if the State of Missouri has executed and there is in effect an Agreement with the United States Atomic Energy Commission, pursuant to Section 274e of the Atomic Energy Act of 1954, as amended, to the State of Missouri department or agency responsible for the licensing and regulation of radioactive materials; provided that this restriction shall apply only to any excavation, drilling or other disturbance affecting the earth more than 12 inches below the site elevations as they existed on October 7, 1971, as shown on topographic survey map prepared by Howland Surveying Company, Inc., Clayton, Missouri, which map is attached hereto and made a part hereof; and

(2) All applicable regulatory requirements of the Atomic Energy Commission or any State agency having regulatory authority over radioactive material shall be complied with.

S. AND IT IS FURTHER AGREED AND UNDERSTOOD by and between the parties hereto and the grantee, by its acceptance of this Quitclaim Deed, acknowledges its understanding of the agreement, and agrees that, as part of the consideration for this Deed, the grantee covenants and agrees for itself, its successors and assigns, that: (1) the program for or in connection with which this Deed is made will be conducted in compliance with, and the grantee, its successors and assigns, will comply with all requirements imposed by or pursuant to the regulations of the FAA as in effect on the date of this Deed (14 CFR Part 15) issued under the provisions of Title VI of the Civil Rights Act of 1964; (2) this covenant shall be subject in all respects to the provisions of said regulations; (3) the grantee, its successors and assigns, will promptly take and continue to take such action as may be necessary to effectuate this covenant; (4) the United States shall

have the right to seek judicial enforcement of this covenant; (5) the grantee, its successors and assigns, will: (a) obtain from any person (any legal entity) who, through contractual or other arrangements with the grantee, its successors and assigns, is authorized to provide services or benefits under said program, a written agreement pursuant to which such other person shall, with respect to the services or benefits which he is authorized to provide, undertake for himself the same obligations as those imposed upon the grantee, its successors and assigns, by this covenant; (b) furnish the original of such agreement to the Administrator of the FAA, or his successor, upon his request therefor; and that this covenant shall run with the land hereby conveyed, and shall in any event, without regard to technical classification or designation, legal or otherwise, be binding to the fullest extent permitted by law and equity for the benefit of, and in favor of the grantor and enforceable by the grantor against the grantee, its successors, and assigns.

IN WITNESS WHEREOF, the party of the first part has caused this Quitclaim Deed to be executed in its name and on its behalf, the day and year first above written.

UNITED STATES OF AMERICA
Acting by and through
Administrator of General Services

By _____
Chief, Real Property Division
Property Management and Disposal Service
General Services Administration
Region 6
Kansas City, Missouri

WITNESSES:

_____

_____

ACKNOWLEDGMENT

STATE OF MISSOURI)
) SS
COUNTY OF JACKSON)

I, Wilbur F. Fidler, a Notary Public in and for said State and County aforesaid, do certify that on the 28th day of March, 1972, before me appeared Charles W. McKinney, Chief, Real Property Division, who executed the foregoing deed, to me personally known, and known to me to be such Chief, Real Property Division, who being by me duly sworn did say that he is such Chief, Real Property Division, and that he signed his name and caused the seal of the General Services Administration to be affixed to said deed in pursuance of proper authority, and that said deed was signed and sealed by him as such Chief, Real Property Division, on behalf of the UNITED STATES OF AMERICA; and that said Charles W. McKinney acknowledged the execution of said deed to be his free act and deed as such Chief, Real Property Division, and the free act and deed of the UNITED STATES OF AMERICA, by the Administrator of General Services, and the free act and deed of the General Services Administration, acting for the UNITED STATES OF AMERICA, and that the seal affixed to said deed is the official seal of the General Services Administration.

IN WITNESS WHEREOF, I hereunto set my hand in the County and State aforesaid on the date last above written.

_____
Wilbur F. Fidler
Notary Public

My Commission Expires: August 14, 1972.

ACCEPTANCE

The St. Louis Airport Authority does hereby accept this Quitclaim Deed and by such acceptance agrees to all of the terms and conditions thereof.

Executed this 15th day of May, 1973.

By _____
David E. Leigh
Title Acting Director of Airport Authority

(Official Seal)

Attest _____
Grace Banack
Title Register

By _____ 6/8/73
John F. Sass, Sr.
Title Comptroller

Certificate of Grantee's Attorney

I, Jack L. Koehr, acting as attorney for the St. Louis Airport Authority herein referred to as the "grantee" do hereby certify: That I have examined the foregoing quitclaim deed and the proceedings taken by the grantee relating thereto and find that the acceptance thereof by the grantee has been duly authorized and that the execution thereof is in all respects due and proper and in accordance with the laws of the State of Missouri, and further that, in my opinion, the Quitclaim Deed constitutes a legal and binding compliance obligation of the grantee in accordance with the terms thereof.

Dated at St. Louis, Missouri the 15th day of May, 1973.

By _____
Title Ct. Counselor

END OF DOCUMENT

1-7203

H34 C. Young S.C
MO.
MO.1
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WESTON MANAGERS DESIGNERS/CONSULTANTS

OFFICE OF TECHNICAL SERVICES
GERMANTOWN, MARYLAND 20874

POSTED

1 April 1988

Mr. Andrew Wallo, III, NE-23
Division of Facility & Site
Decommissioning Projects
U.S. Department of Energy
Germantown, Maryland 20545

SUBJECT: HISTORICAL SUMMARY - FUSRAP SITES - ST. LOUIS, MISSOURI

Dear Mr. Wallo:

The attached paper, prepared in response to your verbal request on 11 March 1988, is provided for your review and comment. The purpose of the task was to update and combine the three separate site summaries contained in the 23 November 1987 draft FUSRAP Background Report into a historical summary for the FUSRAP sites in the St. Louis area.

This task was accomplished in conjunction with a review of the Site Description and History of Operations/Ownership sections of the draft RI/FS Work Plan for the St. Louis sites. That review was completed and a marked up copy of the draft document was delivered on 31 March 1988.

Please contact Charles Young if you have questions or comments concerning the attached paper or the results of our review of the document described above.

Sincerely,

C. R. Levis
Project Manager

CDY/djn
Attachment

cc: W. Murphie
G. Turi
FUSRAP File

bcc: R. Levis
D. Kozlowski
K. Wills

B/13

3/31/88

HISTORICAL SUMMARY

FUSRAP SITES - ST. LOUIS, MISSOURI

GENERAL: Formerly Utilized Sites Remedial Action Program sites located in the vicinity of St. Louis, Missouri (Figure 1), include the former Mallinckrodt Chemical Works, currently identified as the St. Louis Downtown Site (SLDS), the St. Louis Airport Site (SLAPS) and the Latty Avenue Site referred to hereafter as the Latty Avenue Properties (LAP). These sites are collectively referred to as the St. Louis Sites. The following is a historical summary of the sites' function, description, owner history and radiological history and status.

SITES FUNCTION

MALLINCKRODT CHEMICAL WORKS was requested by the Army's Manhattan Engineer District (MED) to develop a commercial uranium purification process in April 1942. The Mallinckrodt Chemical Works was the sole source of purified natural uranium compounds in production quantities until well into 1943. Initially, uranium dioxide (UO_2) was produced from U_3O_8 feed material. Production of uranium tetrafluoride (UF_4), also known as green salt, was started in late 1942. All work from 1942 to 1945 was carried out in existing buildings at the Main Plant and Plant 4 on Broad Street in St. Louis. A new refinery, Plant 6, located at 65 Destrehan Street, began operations in 1946 to process pitchblende ore and produce UO_2. Additional facilities at the Destrehan Street location (Plants 6E and 7) began operation during 1950 and 1951. In addition to the production of UO_2 and UF_4, operations at these facilities included the production of uranium derby metal, the reversion of UF_4 to produce UO_2 or U_3O_8, the extraction and concentration of thorium-230

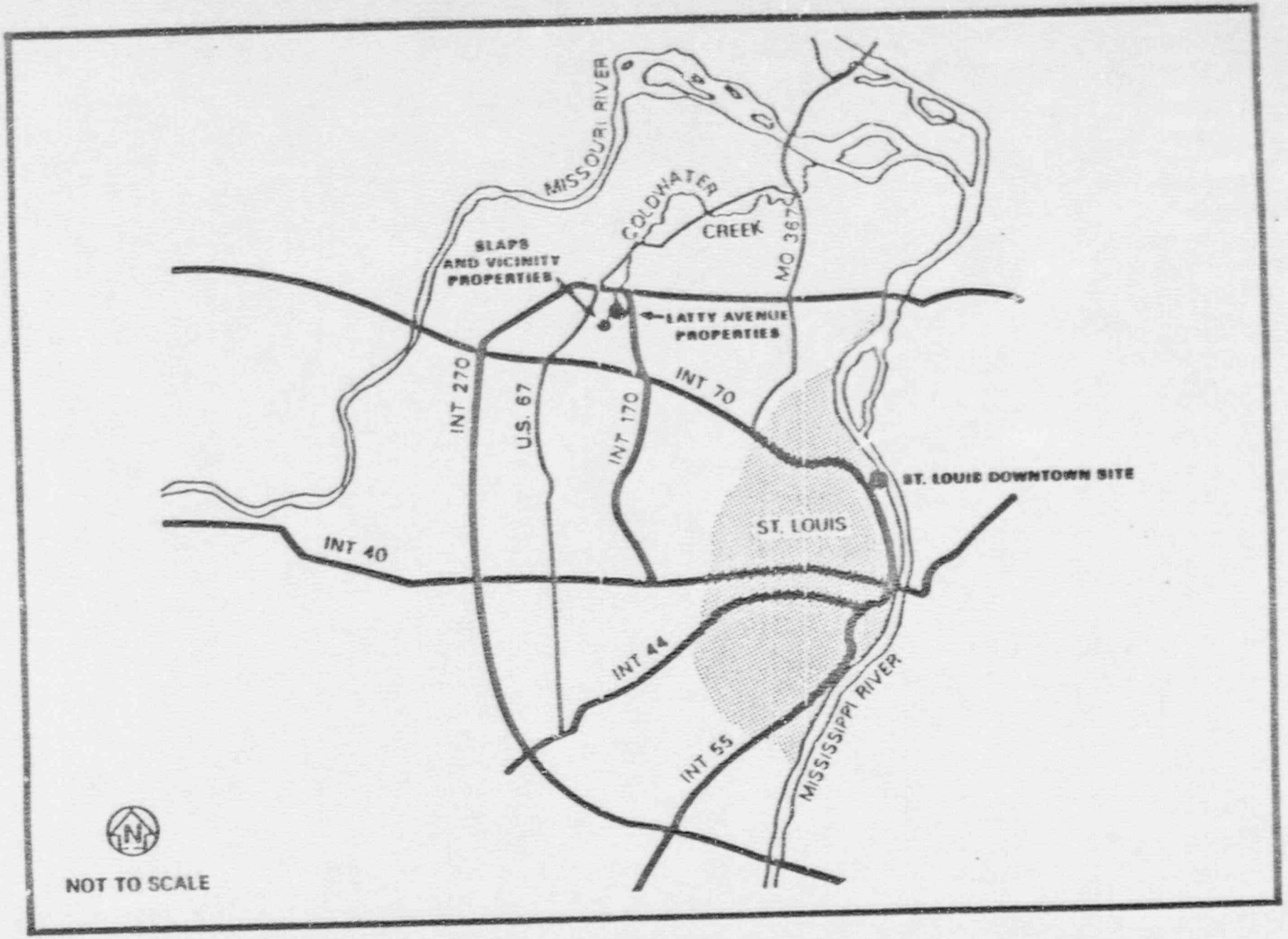

FIGURE 1. LOCATION OF ST. LOUIS SITES

from pitchblende raffinate, experimental processing of very low enrichment UF_4, and the recovery of scrap uranium metal. Work at Mallinckrodt plants in St. Louis under contracts with the MED and its successor, the Atomic Energy Commission (AEC), was terminated in 1957 and transferred to the new AEC feed material processing center at Weldon Spring, Missouri, operated by Mallinckrodt, Inc., under contract with the AEC.

ST. LOUIS AIRPORT STORAGE SITE was operated by the MED and the AEC from 1946 to 1953 to store wastes and residues, most of which were generated during uranium processing operations at the Mallinckrodt Chemical Works. From 1953 until 1967, the site was operated by Mallinckrodt, Inc. under contract with the AEC.

Residues stored at the site included pitchblende raffinate (AM-7), radium bearing residues (K-65), barium cake residue (AJ-4), Colorado raffinate residues (AM-10), and miscellaneous residues that included interim residue plant tailings (C-701) from the Destrehan Street facility, and Japanese uranium-containing sand and Vitro residues (C-6) from the AEC facility in Middlesex, New Jersey. Other materials stored at the site included used dolomite liner and recycled magnesium fluoride liner generated as slag, empty steel drums and steel and alloy scrap.

The K-65 residues, stored in drums at the site until 1948, were shipped to the Lake Ontario Storage Site in Model City, New York. All of the interim residue plant tailings from the Destrehan Street plant were shipped to Fernald, the AEC Feed Materials Production Center, in 1959. A portion of the C-liner slag was also shipped to Fernald during the early 1960's. An estimated 3,000 tons of contaminated scrap metal, including some 60,000 unreconditionable metal drums, were purchased from the AEC by David A. Witherspoon, Inc. of Knoxville, Tennessee, and removed from the site during late 1962 and early 1963 under AEC Source Material License No. SUB-587.

"A Committee Report on Disposition of St. Louis Airport Storage Site", dated November 5, 1965, indicates the following inventory of uranium residues remaining at the site.

Uranium Residues	Quantity in Tons
Pitchblend Raffinate (AM-7)	74,000
Colorado Raffinate (AM-10)	32,500
Barium Sulfate Cake-Unleached (AJ-4)	1,500
Barium Sulfate Cake-Leached (AJ-4)	8,700
Miscellaneous material in Drums	350
C-Liner Slag	4,000
Total	121,050

Contaminated waste and building rubble generated during the decontamination of the Destrehan facility (the remains of one office building and three plants) were added to the materials stored at the site.

LATTY AVENUE PROPERTIES (9200 Latty Avenue) owned by Continental Mining and Milling Company of Chicago, Illinois, was used to store residues from uranium processing operations that were purchased from the AEC in 1966. The residues were moved from the St. Louis Airport Storage Site to 9200 Latty Avenue during 1966 and 1967 under AEC License No. SMA-862. Cotter Corporation conducted drying operations on the site prior to shipment of their initial purchase of the residues from the site under AEC License No. SUB-1072.

SITE DESCRIPTIONS

MALLINCKRODT CHEMICAL WORKS was located in the eastern part of St. Louis, near the McKinley Bridge crossing the Mississippi River (Figure 2). The main offices at the site were located on Second and Mallinckrodt Streets. Work under MED contracts from 1942 to 1945 was carried out in existing facilities at the Main Plant (Plants 1 and 2) and Plant 4 on North Broadway. A building adjacent to the

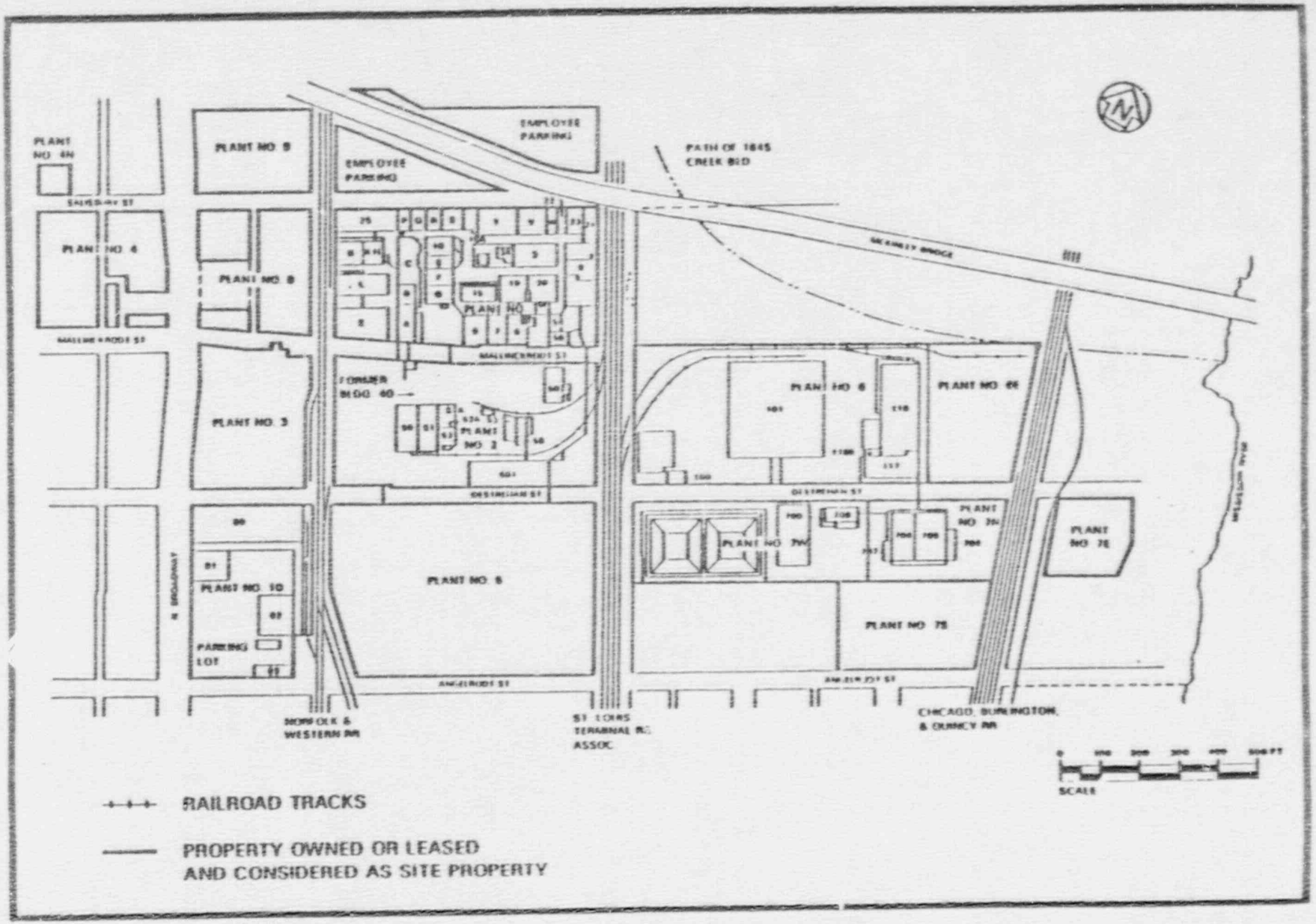

FIGURE 2. SLDS SITE MAP

Main Plant, leased from the St. Louis Door and Sash Company by the MED, was equipped with government-owned equipment in the summer of 1943 and served as a green salt production facility beginning the fall of 1943. The property owned by St. Louis Door and Sash Company and its successor, Rock Island Mill Work Company of Rock Island, Illinois, was located on North Broadway, apparently adjacent to the Mallinckrodt Main Plant. Property covered by the lease(s) was purchased by the Mallinckrodt Chemical Works in 1954. In 1946, a new refinery (Plant 6) located at 65 Destrehan Street began operations to process pitchblende ore and produce uranium dioxide. Additional facilities (Plants 6E and 7) were constructed at the Destrehan Street location in 1950 and 1951. During this period Plant 4 was modified to be used as a metallurgical pilot plant for development work with uranium metal. Plant 6E was used to produce uranium metal and Plant 7 was used to produce uranium tetrafluoride (UF_4). Operations at Plant 4 were terminated and the plant was closed from 1955 to 1956. All operations at the Destrehan Street facilities were terminated and the plants were closed in 1957.

Since 1962, Mallinckrodt, Inc. has used these properties for various purposes related to its commercial chemical operations. Some of the buildings used under contracts with the MED and AEC have been torn down and some are being used as warehouses. New buildings have been constructed at Plant 4 and at the Destrehan Street location. About 20 of the original buildings used to perform work under contracts with the MED and AEC remain. Parts of the Destrehan Street site have been used for storage of columbium-tantalum ore, a Nuclear Regulatory Commission (NRC) licensed material.

ST. LOUIS AIRPORT STORAGE SITE is a 21.7 acre tract located about 24 kilometers from downtown St. Louis and is adjacent to the northern boundary of the Lambert-St. Louis International Airport (Figure 3). Public and private properties in the vicinity of the St. Louis

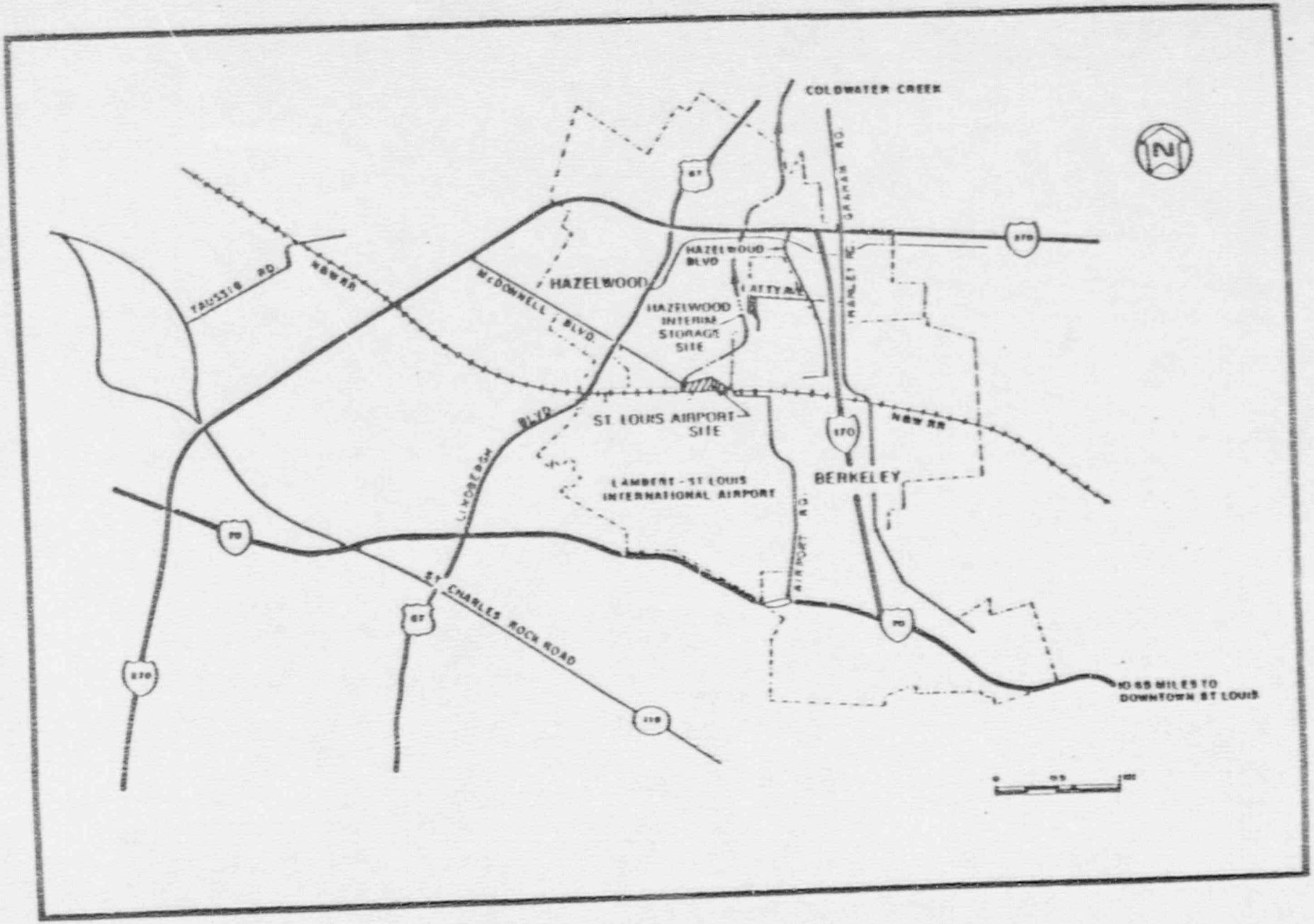

FIGURE 3. LOCATION OF ST. LOUIS AIRPORT SITE

Airport Storage Site found to contain residual radioactive material from the site are included as a part of the site for purposes of identification and remedial action.

LATTY AVENUE PROPERTIES are located in the Hazelwood and Berkley communities and include the property at 9200 Latty Avenue and vicinity properties along Latty Avenue. This heavily industrialized area is approximately one kilometer north of the Lambert-St. Louis International Airport. The site occupies about 11.6 acres. The western portion of the site, currently occupied by Futura Coatings, Inc., is separated from the eastern portion of the site by a chain link fence. The eastern portion of the site, known as the Hazelwood Interim Storage Site (HISS) contains a pile of debris generated during the recent decontamination of the western portion of the site (3.5 acre tract) by the owner. The waste pile was approximately 100 meters long, 60 meters wide, and 6 meters high. A significant volume of residue from cleanup of vicinity properties has since been added to the waste stored on this portion of the site. A layout of the site and location of the storage piles on the property is shown in Figure 4.

OWNER HISTORY

MALLINCKRODT CHEMICAL WORKS owned the site. Portions of the North Broadway facility (Main Plant and Plant 4) and the Destrehan Street facility were leased by MED. Certain other buildings were constructed for or were owned by the AEC. On February 9, 1961, by Modification 122 to AEC contract W-14-108-Eng-8, Mallinckrodt purchased the AEC owned property located on the site. All remaining facilities are owned and operated solely by Mallinckrodt, Inc. (formerly the Mallinckrodt Chemical Works).

ST. LOUIS AIRPORT STORAGE SITE was acquired by the MED in 1946. The site was operated by the MED and its successor, the AEC, as a

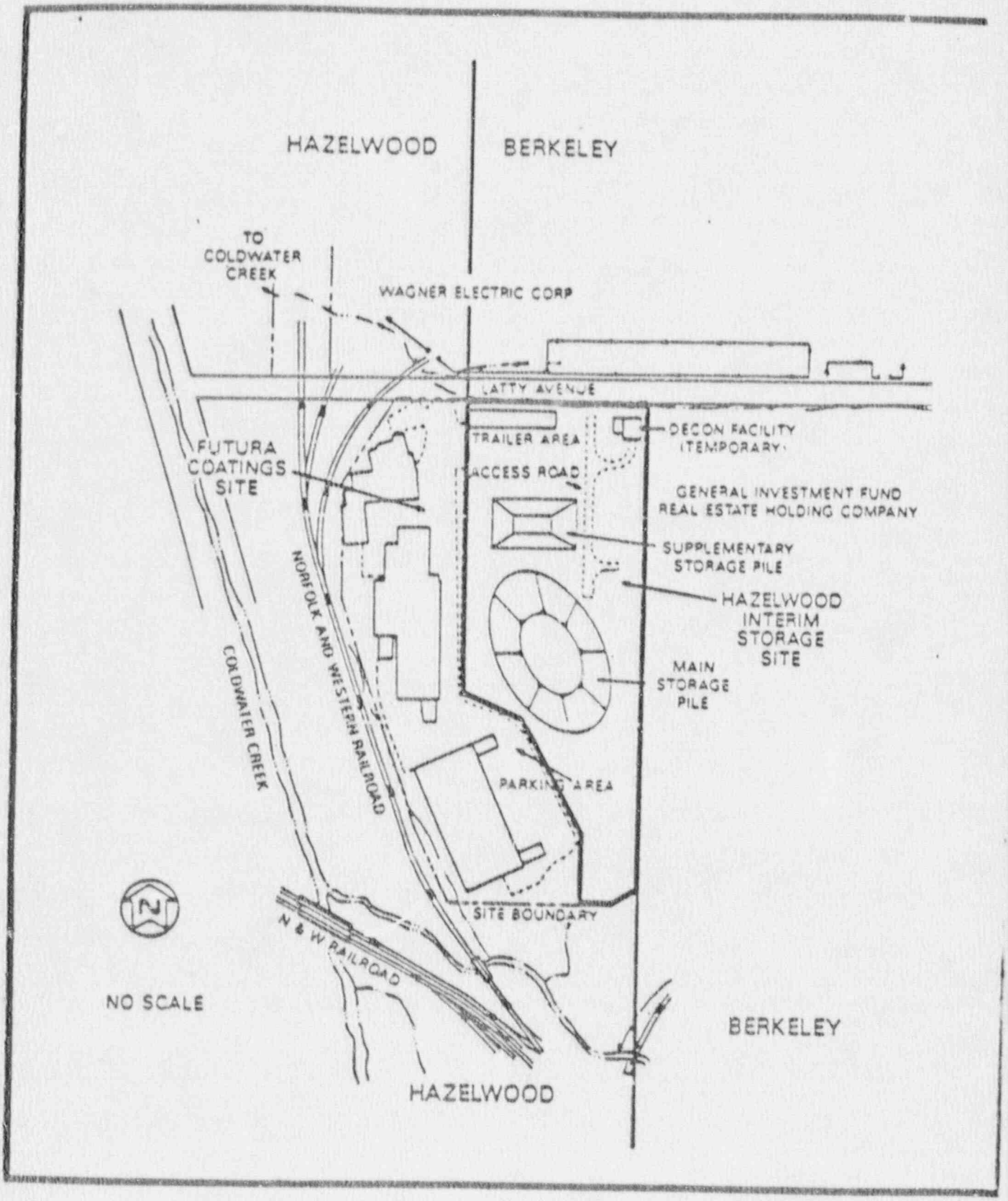

FIGURE 4. SITE MAP - LATTY AVENUE PROPERTIES

storage site for residues from uranium processing from 1946 to 1953. From 1953 to 1967, the site was operated by Mallinckrodt, Inc., under contract with the AEC. In 1969, the AEC approved (by permit) use of the site on a limited basis by the St. Louis Airport Authority. Title to the property was transferred to the St. Louis Airport Authority by quitclaim deed made on March 8, 1972, and accepted by the Airport Authority on May 15, 1973. The Department of Energy (DOE) is considering acquisition of the site pursuant to provisions of the fiscal year 1985 Energy and Water Development Appropriations Act (Public Law 98-360) for use as a disposal site.

LATTY AVENUE PROPERTIES include the site at 9200 Latty Avenue and vicinity properties that are found to contain residual radioactive material originating from the site.

In 1966, the property at 9200 Latty Avenue and the uranium bearing residues purchased from the AEC and moved from the St. Louis Airport Storage Site were owned by Continental Mining and Milling of Chicago, Illinois. The uranium bearing residues were transported to and stored at the Latty Avenue property by Continental Mining and Milling under AEC License SMA-862. In 1967, the Commercial Discount Corporation seized these assets by way of a foreclosure action and sold most of the uranium bearing residues to the Cotter Corporation. The Cotter Corporation dried the purchased residues on-site before shipment to their Canon City, Colorado, uranium mill. Possession of the residues by Commercial Discount Corporation was covered under AEC License No. SMC-907. The remaining residues sold to the Cotter Corporation in December 1969 were removed from the site by 1973. The property at 9200 Latty Avenue was purchased by Mr. E. Dean Jarboe in June 1977. Mr. Jarboe currently operates Futura Coatings, Inc. on the western portion of the site.

RADIOLOGICAL HISTORY AND STATUS

MALLINCKRODT CHEMICAL WORKS Main Plant (Plants 1 and 2) was surveyed and decontaminated to within existing AEC criteria by Mallinckrodt during the period 1948 to 1950. In 1951, AEC returned the Main Plant to Mallinckrodt for unrestricted use. Between 1957 and 1962, the Destrehan properties and Plant 4 were decontaminated by an AEC subcontractor, surveyed by Mallinckrodt, and were released by AEC for unrestricted use. In the process, some of the buildings (primarily at Plant 4) were removed. Contaminated earth was removed and excavations were backfilled. Decontamination wastes, scrap, and rubble from these operations were buried at the west end of the St. Louis Airport Storage Site or in an abandoned quarry at Weldon Spring. Decontamination procedures were supervised by the AEC's New York Operations Office early in the program and by the Oak Ridge Operations Office during the Destrehan Street and Plant 4 decommissionings. The AEC decontamination activities did not reduce radioactivity levels to background, but reduced them to prevailing permissible levels for unrestricted use.

Oak Ridge National Laboratory conducted a radiological survey of the Mallinckrodt property formerly used for uranium processing from July through September 1977. Contamination levels inside and outside some of the buildings were above limits set by current Federal guidelines concerning the release of property for unrestricted use. Elevated external radiation levels were measured at some outdoor locations and in some of the buildings. Licensable concentrations of uranium were found in soil, and the concentration of uranium in one water sample taken from an old waste pit was in excess of Federal standards. Radon and radon-daughter concentrations in three buildings were in excess of current Federal guidelines for nonoccupational radiation exposure.

Based on a review of survey results and historical records, the Department of Energy determined in 1984 that it has authority under

the Atomic Energy Act of 1954, as amended, to clean up the Mallinckrodt site. A preliminary engineering and environmental evaluation was prepared in December 1981. Planning for characterization was completed in 1987, with work scheduled to begin in early 1988.

ST. LOUIS AIRPORT STORAGE SITE residue and waste inventory and radiation survey was conducted by the AEC in 1965 to formulate a plan for removing the residues, cleaning up the site to permit unrestricted use and then disposing of the property. Most of the uranium bearing residues were sold to the Continental Mining and Milling Company in 1966 and transported to their property at 9200 Latty Avenue. Partial decontamination of the site was initiated by the St. Louis Airport Authority, in fulfillment of a 1969 agreement with the Federal government for limited use of the property. All structures but the fence were razed and buried on the site. The surface of the site was covered by 1 to 3 feet of clean fill to control runoff and erosion and reduce surface radiation levels. Additional fill was required in several areas to reduce gamma radiation to acceptable levels. The site was conveyed to the Airport Authori by quitclaim deed in 1973 stipulating that the property could be neither leased, sold, salvaged, or disposed of by the Airport Authority - nor used for other than airport purposes - without the written consent from the Administrator of the Federal Aviation Administration.

In September and October 1979, six wells were installed at the site. Groundwater monitoring indicates that, although radionuclides stored on-site are leaching into the groundwater, the concentrations observed are low for all radionuclides except total uranium. The total uranium concentrations in three of the six on-site wells are high because the wells are located in or adjacent to buried radioactive material. Radionuclide concentrations in groundwater

have shown no trends. Results of monitoring at some wells indicate increases while others indicate decreases in radionuclide concentrations.

Elevated concentrations of radionuclides were found on-site and north of the site in ditches north and south of McDonnell Boulevard and beneath a portion of the road. The contamination appears to have resulted primarily from erosion of residues stored on the Storage Site and possibly from spillage along haul roads used to transport the uranium bearing residues to the site, and from the site to the property at 9200 Latty Avenue by Continental Mining and Milling Company in 1966 and 1967. Additional site characterization efforts to further define contaminants and waste volume estimates will be completed in 1988.

Department of Energy use of the site to consolidate and dispose of residues from the Latty Avenue Properties and properties in the vicinity of the St. Louis Airport Storage Site was authorized by Public Law 98-360.

LATTY AVENUE PROPERTIES. In an effort to decontaminate the property at 9200 Latty Avenue, the Cotter Corporation mixed the residues that remained with an estimated 39,000 tons of soil removed from the top 12 to 18 inches of the site. The material was shipped to a local landfill in 1974, apparently without AEC knowledge or approval. Cotter requested and was granted termination of AEC License SUB-1072 in November 1974.

Soil analyses conducted by the Nuclear Regulatory Commission (NRC) in 1976 revealed residual uranium and thorium concentrations on the site that exceeded criteria for unrestricted land use. Under NRC radiation safety coverage, the current owner, Mr. D. Jarboe, decontaminated the buildings and the 3.5 acre tract surrounding them on the western portion of the site. The decontamination debris was piled onto the eastern portion of the site, currently known as the

Hazelwood Interim Storage Site (HISS). The western portion of the site that was decontaminated by Mr. Jarboe was released by the NRC for unrestricted use in August 1979.

A radiological assessment of the area of the decontamination debris was conducted in June 1981. Elevated concentrations of uranium, actinium and thorium were found. Leachability of these radionuclides from the debris was considered low. Air and groundwater monitoring data collected on a biweekly basis during 1982 and 1983 indicated the presence of radionuclides, primarily Thorium-230 and Radium-226, but in concentrations well below Department of Energy guidelines. Environmental monitoring in this area of the site (HISS) was continued in 1985. Monitoring results indicate that the HISS is in compliance with DOE guidelines and radiation protection standards.

Results of radiological scan surveys conducted in 1983 and 1984 revealed elevated levels of contamination along the north, east, and south sides of the site. Much of the contamination found was outside the boundaries of the site. Subsequent radiological characterization of the western portion of the site occupied by Futura Coatings, Inc. revealed concentrations of radionuclides in excess of current DOE guidelines. Congress directed the Department of Energy to implement a research and development program for cleanup of the site. Work is being accomplished under provisions of Public Law 98-50 and Public Law 98-360, Energy and Water Appropriations Acts of 1984 and 1985, respectively.

APPENDIX A:

ST. LOUIS SITE AND CONTAMINANT DESCRIPTION

Three FUSRAP sites, collectively referred to as the St. Louis Site, are located in the state of Missouri. These sites include the St. Louis Downtown Site, the St. Louis Airport Site (SLAPS) and vicinity properties, and the Latty Avenue Properties. A description of these sites and contaminants is provided in the following sections. Site locations are shown in Fig. 1.

A.1 ST. LOUIS DOWNTOWN SITE

The 18.2-ha (45-acre) St. Louis Downtown Site is located on Destrehan and Broadway Streets in downtown St. Louis (Fig. 2). It is currently owned by Mallinckrodt, Inc., and contains more than 20 buildings and other facilities involved in the manufacture of chemical products.

In 1942, the U.S. Army Corps of Engineers, Manhattan Engineer District (MED) -- a predecessor of the AEC -- requested the Destrehan Street Refinery and Metal Plant (later the Mallinckrodt Chemical Works) to initiate activities for the production of uranium dioxide and trioxide (UO_2 and UO_3). Uranium ore was subsequently processed at the facilities through 1957. Plant operations involved the refinement of uranium concentrate, uranium compounds, and uranium metal for use in research, development, and production programs of the federal government (U.S. Dept. Energy 1987). Other activities included recovery of scrap uranium, extraction and concentration of thorium from pitchblende raffinate, and experimental processing of very-low-enrichment uranium tetrafluoride (UF_4). By the time operations ceased in 1957, it is estimated that more than 45,000 t (50,000 tons) of natural uranium products had been processed at the site (Bechtel Natl. 1986a).

During the uranium-processing period, certain buildings on-site were constructed for and owned by the MED/AEC. The remainder of the approximately 80 buildings involved in the program were owned by Mallinckrodt, and some were leased to the MED/AEC. Buildings and areas in which uranium was handled are shown in Fig. 2. Buildings that were used during the uranium project and remain on the site are listed in Table 1.

Processing operations were conducted in Plants 2 and 4 (currently Plant 10) from 1942 through 1945. In 1945, activities were terminated at Plant 2, but some limited uranium research continued at Plant 4 (currently Plant 10) through 1956. Uranium processing occurred at Plants 6, 6E, 7N, and 7W from 1945 to 1957, at which time all such operations ceased. Following this date, the government-owned buildings were either demolished or transferred to Mallinckrodt. A radiological survey of the site was conducted by Oak Ridge National Laboratory (ORNL) in 1977. Results of the survey identified beta-gamma dose rates in excess of U.S. Nuclear Regulatory Commission (NRC) cleanup criteria in areas within Buildings K1E, 25, 50, 51, 52A, 705, 706, and 707, and at localized spots in Buildings 40, 51A, 52, 116, 117, 700, and 704. The NRC criteria were

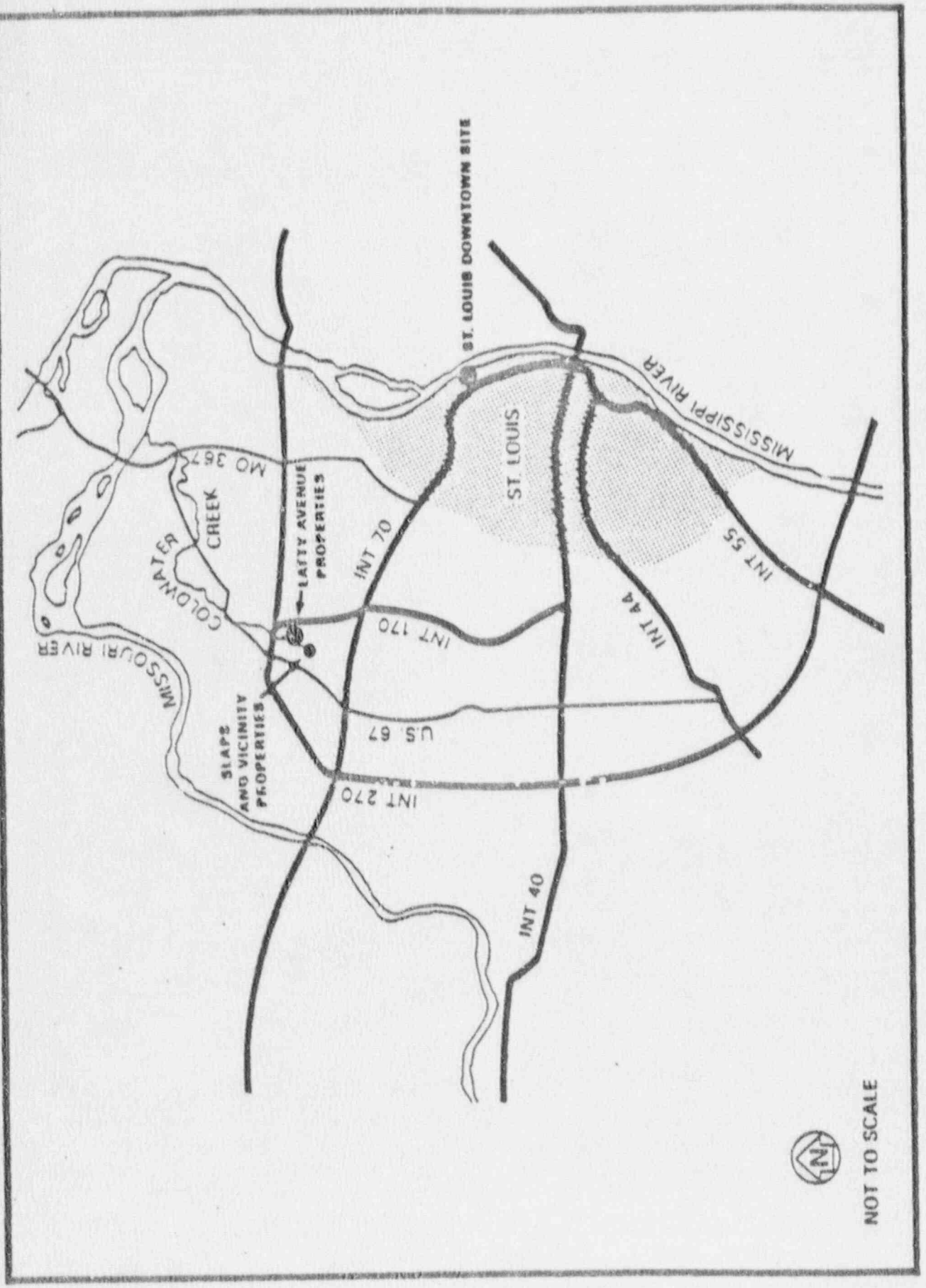

FIGURE 1 LOCATION OF ST. LOUIS FUSRAP SITES

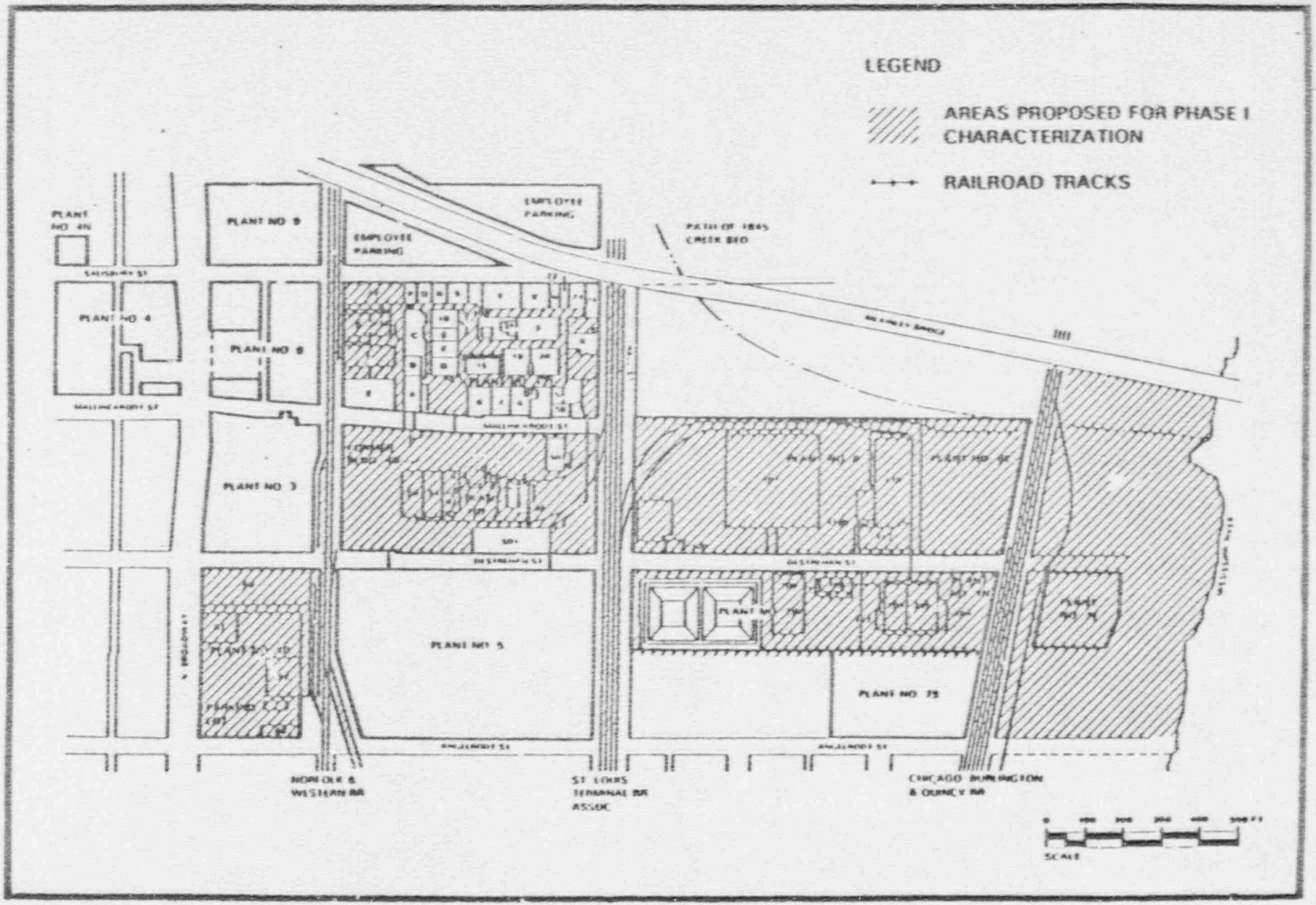

FIGURE 2 ST. LOUIS DOWNTOWN SITE

TABLE 1 Existing Buildings and Areas Used for Uranium Project Work at the St. Louis Downtown Site

Plant	Building or Area	Use
1	25-1	Lab, research and development, control
	25-2	Lab, gas chromatograph spectrophotometry
	Alley	Extraction
	K1E	Pilot plant, semiworks (pitchblende)
	A	General plant mechanical
2	50	General storage, utility, UF_4 experiment
	51	Digestion and treatment of black oxide (U_3O_8) feeds
	51A	Denitration and hydrogen reduction
	52	Ether extraction
	51X	Extraction of pitchblende liquor
	38	Personnel change house
	40	Temporary storage of residues
10[a]	Part of RR dock	Movement of materials
6	100	Electric substation
	116-1	Manufacture of uranium metal, warehouse
	116-2	Warehouse, office, graphite machining
	116B	Electric substation
	117-1	Security, change house (trace pitchblendes)
	117-2	Lunchroom, laundry, contractor change room (trace pitchblendes)
7N	704	Hydrogen fluoride offgas treatment
	705	Manufacture of UO_2 and UF_4
	706	Storage of UO_2, UO_3, and UF_4
	707	Manufacture of hydrogen and nitrogen from ammonia
7W	708	Magnesium storage, packaging
	700	Warehouse, safety office, some core machining

[a]Plant 10 was known as Plant 4 during MED/AEC activities. The current Plant 4 area consists of parking lots and one buiding, which were constructed after the uranium project work.

Source: Data from Goldsmith et al. (1981).

also exceeded at the following outdoor locations: the walls outside of Buildings 51, 51A, 52, and 52A; in the vicinity of Buildings 81, 82, 101,116, 117, 700, 704, 705, 706, 707, and 708; on the concrete slab east of Building 705; on the storage pad south of Building 708; on the roofs of Buildings 51A, 52A, 116, 116B, and 706; and in the alley separating Buildings 25 and K1E. Alpha levels exceeded NRC cleanup criteria for surface contamination of uranium in certain areas of Building 705 and the criteria for radium in areas of Buildings K1E, 25, 40, 51A, 100, and 117. On outdoor surfaces, alpha levels associated with thorium-230 exceeded the cleanup criteria on the storage pad south of Building 708 and possibly on the roof of Building 100. Scattered surface soil samples taken from the vicinity of Plant 7 and the railroad tracks south of Building 75 and near Building 82 contained concentrations of radium-226 and uranium-238 in excess of soil cleanup criteria. Subsurface soil samples in areas east of Buildings 51, 51A, 52, and 52A contained uranium-238 at levels that exceeded these cleanup criteria as well. The level of uranium-238 in a single sample taken from an old waste pit between Buildings 100 and 101 exceeded the concentration guide for uranium in water. Nonoccupational concentration guidelines for radon-222 were exceeded in Buildings K1E, 52A, and 101 (Goldsmith et al. 1981).

Based on available information, the estimated volume of waste at the St. Louis Downtown Site is 52,600 m^3 (70,000 yd^3). Detailed investigations were initiated in 1988 to define site hydrogeology and the chemical and radiological constituents at the site. The initiation of additional site characterization efforts to further define contaminants and waste volume estimates are planned for 1988 and will be completed in 1989.

A.2 ST. LOUIS AIRPORT SITE

The St. Louis Airport Site (SLAPS) is located in the city of St. Louis directly north of the Lambert-St. Louis International Airport and is bordered by McDonnell Road to the north and east, Coldwater Creek to the west, and the Norfolk and Western Railroad and Banshee Road to the south (Fig. 3) The site covers 8.7 ha (21.7 acres) and is currently owned by the St. Louis Airport Authority. In 1946, the MED obtained consent to use the site primarily for storage of radioactive residues. The waste material resulted from uranium-processing operations conducted at the St. Louis Downtown Site. In 1947, the MED acquired title to the SLAPS property from E. Callaway et al., following condemnation proceedings. Responsibility for operation of the site was maintained by the MED, and subsequently by the AEC, until it was transferred to Mallinckrodt Chemical Works (currently Mallinckrodt, Inc.) in 1953. Mallinckrodt operated the St. Louis Downtown Site under contract to the AEC from 1953 through 1967 (U.S. Dept. Energy 1985).

Recoverable process wastes were stored at SLAPS in anticipation of claim of ownership of these wastes by the original owner of the ore (African Metals). In addition, the site was used for storage and/or disposal of equipment, miscellaneous residues, and contaminated materials and scrap. The stored wastes included Belgian Congo pitchblende raffinate residues, radium-bearing residues, Colorado raffinate residues, and leached and unleached barium sulfate cake (U.S. Dept. Energy 1981). Contaminated

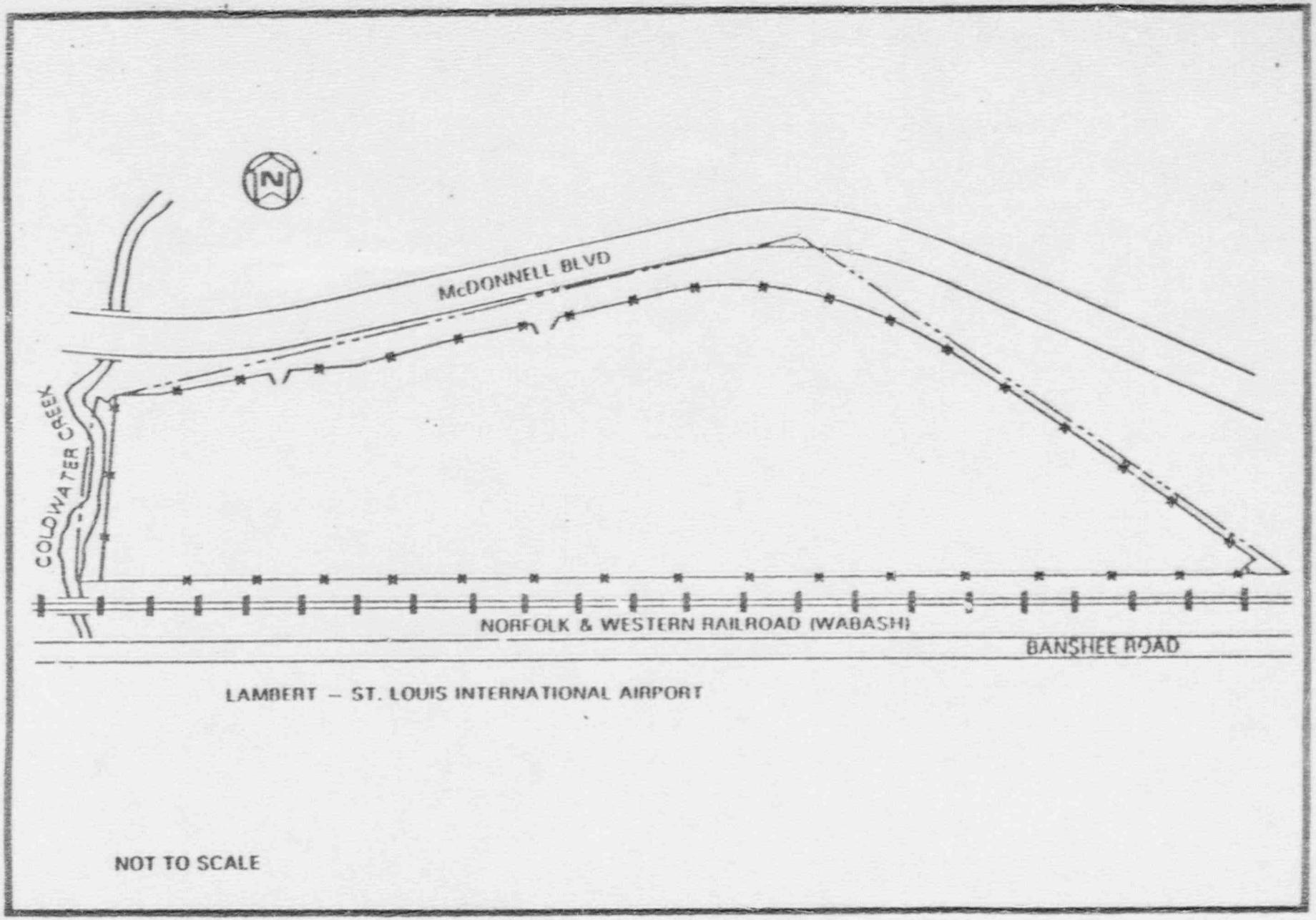

FIGURE 3 LAYOUT OF SLAPS

scrap metal and other miscellaneous radioactive materials were buried in the western end of the property in 1952. Most of the residues were stored on open ground. The residue piles covered the eastern two-thirds of the site, rising about 6 m (20 ft) above ground level. The site was fenced to restrict access, in order to limit the potential for public exposure to direct radiation. In addition to the residue piles, an office building and three plant buildings were located on the property.

The AEC conducted a waste inventory and radiological survey of SLAPS in 1965, identifying 110,000 t (121,000 tons) of refinery residue and contaminated debris on the open ground. Radioactive contamination was also found on surface structures and in the soil. In 1966 and 1967, most of the stored residues were sold for mineral recovery and transported to 9200 Latty Avenue.

Partial decontamination of SLAPS was initiated by the St. Louis Airport Authority, in fulfillment of an agreement with the federal government (acquisition permit of November 1969). Remaining barium sulfate wastes were transported to 9200 Latty Avenue, currently known as the Latty Avenue Properties, and all structures but the fence were razed and buried on-site at SLAPS. The surface was covered with 0.3 to 0.9 m (1 to 3 ft) of clean fill to control runoff and erosion and reduce surface radiation levels (U.S. Dept. Energy 1980). Following completion of the partial decontamination effort, a topographical and radiological survey of SLAPS was performed by the AEC in 1971. Surface dose rates were measured at less than 1 mrad/h, although uranium-238, radium-226, and thorium-230 remained buried on-site (Argonne Natl. Lab. 1981).

The SLAPS property was conveyed by quitclaim deed to the St. Louis Airport Authority in 1973. Because radioactive materials remained on-site, the deed specified that the property could be neither leased, sold, salvaged, or disposed of by the Airport Authority -- nor used for other than airport purposes -- without written consent from the Administrator of the Federal Aviation Administration.

In 1976 and 1978, ORNL performed radiological surveys of SLAPS. Elevated concentrations of radionuclides were found on-site and north of the site in ditches north and south of McDonnell Boulevard and beneath a portion of the road. The contamination appears to have resulted primarily from erosion of the residues stored on-site as surface piles from 1946 to 1967 (Argonne Natl. Lab. 1981).

Soil contamination levels at the site have been found to range from background to 900 pCi/g uranium-238 and 1,400 pCi/g radium-226 (U.S. Dept. Energy 1985). Contamination has also been found on vicinity properties, including the ditches north and south of SLAPS, an adjacent ballfield, and areas along McDonnell Boulevard and other potential transportation routes. Vicinity properties south of SLAPS include Banshee Road and a 30-m (100-ft) strip south of and parallel to the roadway. Portions of Coldwater Creek are also considered to be SLAPS vicinity properties.

The estimated volume of waste at SLAPS and the vicinity properties ranges from 213,650 to 357,000 ^{3} (283,700 to 474,000 yd^3). Additional site characterization efforts to further define contaminants and waste volume estimates are ongoing and will be completed in 1988.

A.3 LATTY AVENUE PROPERTIES

The Latty Avenue Properties are located in Hazelwood and Berkeley and consist of the property at 9200 Latty Avenue and vicinity properties adjacent to Latty Avenue and its extension (Fig. 4). The property at 9200 Latty Avenue covers an area of 4.4 ha (11 acres) and is separated by a chain link fence into (1) the western Futura Coatings section (2.2 ha [5.5 acres]), which contains three building complexes, and (2) the eastern Hazelwood Interim Storage Site (HISS) (2.2 ha [5.5 acres]), which contains a vehicle decontamination facility and two covered surface storage piles of radioactive material. The property is currently owned by Jarboe Realty and Investment Company and is leased to Futura Coatings, Inc. Much of the Futura section is paved for parking and for delivery vehicle access to the building complexes. The complexes are in good repair and support the manufacturing activities of Futura Coatings.

The main storage pile located on the HISS resulted from decontamination activities during preparation of the Futura section for commercial development. The storage pile is irregular in shape, averaging about 100 m (330 ft) long, 60 m (200 ft) wide, and 6 m (20 ft) high. Its edges are gently sloping, although there is a steep rise to the highest point. The waste volume of the pile is estimated to be approximately 10,000 m^3 (13,000 yd^3) (Argonne Natl. Lab. 1984).

Uranium-processing activities occurred at the St. Louis Downtown Site from 1942 through 1957 and generated ore residues and process wastes that were subsequently stored at SLAPS. The Continental Mining and Milling Company of Chicago, Illinois, purchased these wastes from the AEC in 1966 and transported them from SLAPS to 9200 Latty Avenue. An estimated 106,000 t (117,000 tons) of radioactive material, containing about 175 t (192 tons) of uranium, was transported. The material consisted of 67,000 t (74,000 tons) of Belgian Congo pitchblende raffinate, containing approximately 103 t (113 tons) of uranium; 29,500 t (32,500 tons) of Colorado raffinate, containing about 44 t (48 tons) of uranium; 7,900 t (8,700 tons) of leached barium sulfate cake, containing approximately 6 t (7 tons) of uranium; 1,400 t (1,500 tons) of unleached barium sulfate cake, containing about 20 t (22 tons) of uranium; and approximately 320 t (350 tons) of miscellaneous residues, containing about 1.8 t (2 tons) of uranium (U.S. Dept. Energy 1981).

In January 1967, the Commercial Discount Corporation of Chicago assumed control of the material and dried an estimated 70,000 t (77,000 tons) of the wastes for shipment to the Cotter Corporation reprocessing facilities in Canon City, Colorado (U.S. Dept. Energy 1981). The Cotter Corporation purchased the wastes remaining on the HISS in December 1969. By November 1970, all but approximately 9,000 t (10,000 tons) of Colorado raffinate and 7,900 t (8,700 tons) of leached barium sulfate cake had been dried and shipped to Canon City (U.S. Dept. Energy 1981; Argonne Natl. Lab. 1984). In 1973, the remaining Colorado raffinate was shipped to Canon City without drying, and the leached barium sulfate cake was moved to the West Lake Landfill in St. Louis County, along with about 30 to 46 cm (12 to 18 in.) of topsoil (Leggett et al. 1977; Ford, Bacon & Davis Utah 1978).

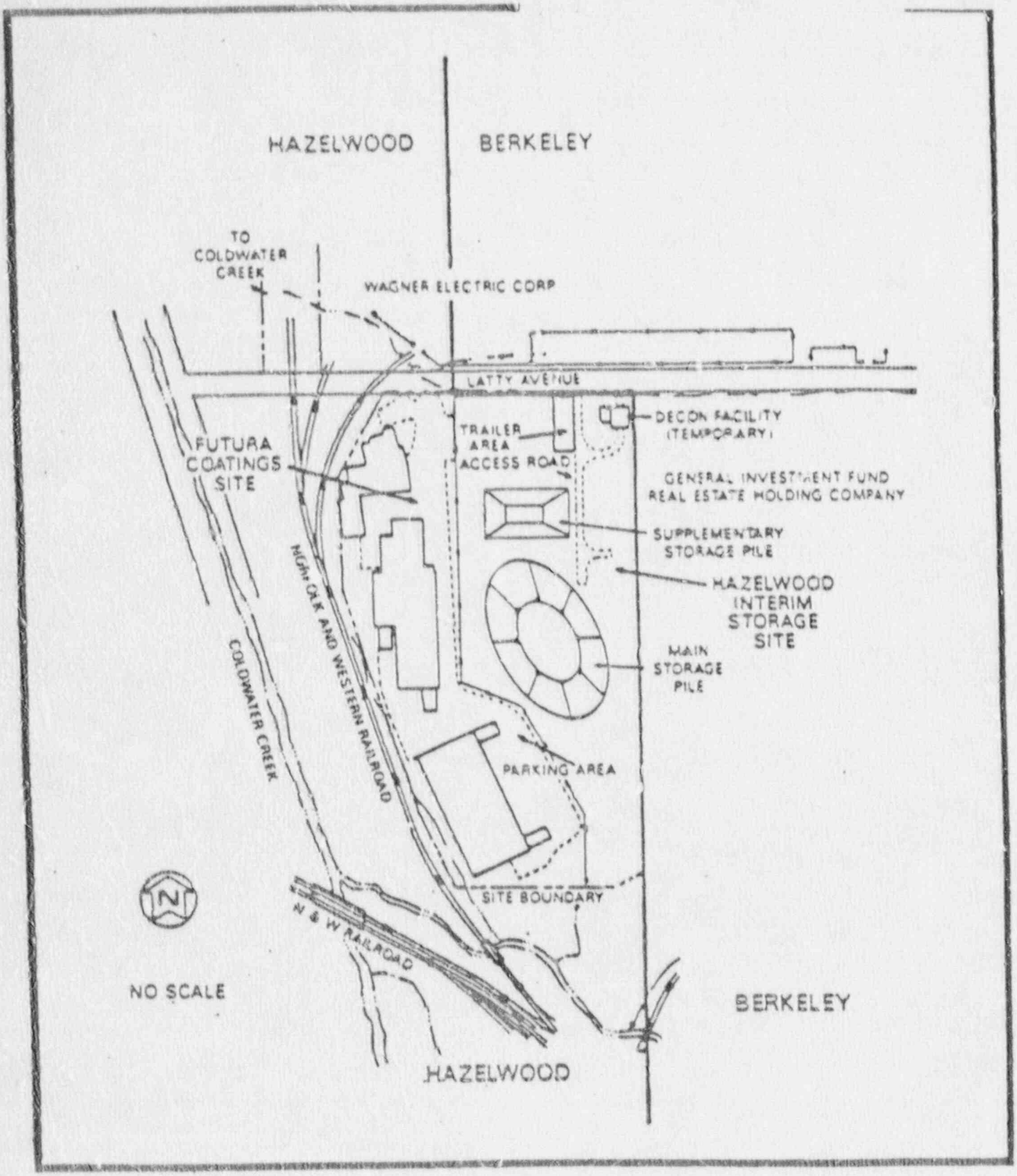

FIGURE 4 LAYOUT OF THE LATTY AVENUE PROPERTIES

The NRC conducted a radiological investigation at 9200 Latty Avenue in 1976. Analysis of soil samples indicated the presence of ore residues, which yielded direct radiation readings at the site in excess of the NRC criteria that govern the release of land areas for unrestricted use (Ford, Bacon & Davis Utah 1978). In 1977, an extensive follow-up survey was performed by ORNL (Leggett et al. 1977). Levels of thorium, uranium, and radium in and around the buildings, as well as in the soil to depths of 46 cm (18 in.), were found to exceed DOE guidelines for residual radionuclide concentrations in soil (Bechtel Natl. 1986b). Subsequent decontamination activities consisted of demolition of one building, removal of flooring from two other buildings, and excavation of about 0.5 m (1.6 ft) of surface soil from the Futura section. Radioactive material resulting from these cleanup activities (about 10,000 m^3 [13,000 yd^3]) was placed on the HISS, where it remains to date (Cole et al. 1981a, 1981b).

In 1981, Oak Ridge Associated Universities characterized the contaminated pile and surveyed the northern and eastern boundaries of the HISS. Above-background radiation levels were found in all areas, and analyses of soil samples taken from the surface to a depth of 0.5 m (1.5 ft) had elevated concentrations of uranium-238, thorium-230, and radium-226. A 1984 survey conducted by ORNL identified contamination of vicinity properties extending along Latty Avenue to Hazelwood Avenue, and from Coldwater Creek to Hanley Avenue (Bechtel Natl. 1986b).

The following remedial action activities were performed during 1984: clearing the Futura section, HISS, and certain adjacent vicinity properties; installing a perimeter fence; excavating and backfilling the edges and shoulders of Latty Avenue; consolidating and covering the waste storage pile; and constructing a decontamination facility. These efforts generated an additional 11,000 m^3 (14,000 yd^3) of contaminated material, which was placed on the HISS main storage pile and covered. By mid 1985, an additional 76 m^3 (100 yd^3) of contaminated soil had been excavated from scattered locations along Latty Avenue. This material was stored and covered at the HISS. Site surveys, testing of materials, and installation of monitoring wells had also been accomplished (Bechtel Natl. 1986b).

The estimated volume of waste at the Latty Avenue Properties ranges from 90,100 to 158,900 m^3 (119,600 to 211,000 yd^3). Additional site characterization efforts to further define contaminants and waste volume estimates are ongoing.

A.4 REFERENCES

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Argonne National Laboratory, 1984, *Action Description Memorandum, Proposed Decontamination of Vicinity Properties at the Hazelwood, Missouri, Site*, prepared for U.S. Department of Energy, Oak Ridge Operations, Oak Ridge, Tenn.

Bechtel National, Inc., 1986a, *Site Plan for Mallinckrodt, St. Louis, Missouri*, DOE/OR/20722-128 Revision 0, prepared by Advanced Technology, Oak Ridge, Tenn., for U.S. Department of Energy, Oak Ridge Operations Office (Nov.).

Bechtel National, Inc., 1986b, *Site Plan for Hazelwood, Hazelwood, Missouri*, DOE/OR/20722-111 Revision 0, prepared by Advanced Technology, Oak Ridge, Tenn., for U.S. Department of Energy, Oak Ridge Operations Office (Sept.).

Cole, L.W., et al., 1981a, *Radiological Evaluation of Decontamination Debris Located at the Futura Chemical Company Facility, 9200 Latty Avenue, Hazelwood, Missouri*, Oak Ridge Associated Universities.

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Ford, Bacon & Davis Utah Inc., 1978, *Engineering Evaluation of the Latty Avenue Site, Hazelwood, Missouri (Formerly Leased by Cotter Corporation)*, FB&DU UC-225, prepared for the U.S. Nuclear Regulatory Commission, Washington, D.C. (Jan.).

Goldsmith, W.A., et al., 1981, *Radiological Survey of the Mallinckrodt Chemical Works, St. Louis, Missouri*, DOE/EV-0005/27; ORNL-5715, prepared by Oak Ridge National Laboratory, Oak Ridge, Tenn., for U.S. Department of Energy (Dec.).

Leggett, R.W., et al., 1977, *Radiological Survey of the Property at 9200 Latty Avenue, Hazelwood Missouri*, Oak Ridge National Laboratory.

U.S. Department of Energy, 1980, *Evaluation of Environmental Impacts Associated with the Former Airport Storage Site of the Atomic Energy Commission, St. Louis County, Missouri*, prepared by R.F. Weston, Inc., for Oak Ridge Operations Office, Oak Ridge, Tenn. (March).

U.S. Department of Energy, 1981, *Description of Missouri Sites Which May Require Remedial Action*, Remedial Action Programs (Oct.).

U.S. Department of Energy, 1985, *Compilation of Background Information Available to the U.S. Department of Energy on a 21.7-Acre Tract of City of St. Louis-Owned Airport and Which May Be Conveyed to DOE Pursuant to Public Law 98-360*, Oak Ridge Operations Office, Oak Ridge, Tenn. (Jan.).

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 300

[FRL-3825-8]

National Priorities List for Uncontrolled Hazardous Waste Sites

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency ("EPA") is amending appendix B of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 CFR part 300, which was originally promulgated on July 16, 1982, pursuant to section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"). CERCLA has since been amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA") and is implemented by Executive Order 12580 (52 FR 2923, January 29, 1987). CERCLA requires that the NCP include a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States, and that the list be revised at least annually. The National Priorities List ("NPL"), initially promulgated as appendix B of the NCP on September 8, 1983 (48 FR 40658), constitutes this list and is being revised today by the addition of 106 sites, including 23 Federal facility sites. Based on a review of public comments on these sites, EPA has decided that they meet the eligibility requirements of the NPL and are consistent with the Agency's listing policies. In addition, today's action removes 10 sites, including one Federal facility site, from the proposed NPL. Information supporting these actions is contained in the Superfund Public Dockets.

This rule results in a final NPL of 1,187 sites, 116 of them in the Federal section; 20 sites are proposed to the NPL, none of them in the Federal section. Final and proposed sites now total 1,207.

EFFECTIVE DATE: The effective date for this amendment to the NCP shall be October 1, 1990. CERCLA section 305 provides for a legislative veto of regulations promulgated under CERCLA. Although *INS v. Chadha* 462 U.S. 919, 103 S. Ct. 2764 (1983), cast the validity of the legislative veto into question, EPA has transmitted a copy of this regulation to the Secretary of the Senate and the Clerk of the House of Representatives. If any section by Congress calls the effective date of this regulation into question, the Agency will publish a notice of clarification in the Federal Register.

ADDRESSES: Addresses for the Headquarters and Regional dockets follow. For further details on what these dockets contain, see section I of the "SUPPLEMENTARY INFORMATION" portion of this preamble.

Docket Coordinator, Headquarters, U.S. EPA CERCLA Docket Office, OS-245, Waterside Mall, 401 M Street, SW, Washington, DC 20460, 202/382-3046

Eve Cunha, Region 1, U.S. EPA Waste Management Records Center, HES-CAN 6, J.F. Kennedy Federal Building, Boston MA 02203, 617/573-5729

U.S. EPA, Region 2, Document Control Center, Superfund Docket, 26 Federal Plaza, 7th Floor, room 740, New York, NY 10278, Latchmin Serrano, 212/264-8[illegible], Ophelia Brown, 212/264-1154

Diane McCreary, Region 3, U.S. EPA Library, 5th floor, 841 Chestnut Building, 9th & Chestnut Streets, Philadelphia, PA [illegible], 215/597-0580

Beverly Fulwood, Region 4, U.S. EPA Library, room G-6, 345 Courtland Street, NE, Atlanta, GA 30365, 404/347-4216

Cathy Freeman, Region 5, U.S. EPA, 5HS-12, 230 South Dearborn Street, Chicago, IL 60604, 312/886-6214

Bill Taylor, Region 6, U.S. EPA, 1445 Ross Avenue, Mail Code 6H-MA, Dallas, TX 75202-2733, 214/65-6740

Steven Wyman, Region 7, U.S. EPA Library, 726 Minnesota Avenue, Kansas City, KS 66101, 913/551-7241

Dolores Eddy, Region 8, U.S. EPA Library, 999 18th Street, suite 500, Denver, CO 80202-2405, 303/293-1444

Lisa Nelson, Region 9, 1235 Mission Street, San Francisco, CA 94103, 415/744-1441

David Bennett, Region 10, U.S. EPA, 9th Floor, 1200 6th Avenue, Mail Stop HW-008, Seattle WA 98101, 206/442-2103

FOR FURTHER INFORMATION CONTACT: Richard Webster, Hazardous Site Evaluation Division, Office of Emergency and Remedial Response (OS-230), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC, 20460, or the Superfund Hotline, Phone (800) 424-9346 (382-3000 in the Washington, DC, metropolitan area).

SUPPLEMENTARY INFORMATION:

Table of Contents:

B/16

I. Introduction

Background

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. sections 9601-9657 ("CERCLA" or the "Act"), in response to the dangers of uncontrolled hazardous waste sites. CERCLA was amended in 1986 by the Superfund Amendments and Reauthorization Act ("SARA"), Public Law No. 99-499, stat. 1613 *et seq.* To implement CERCLA, the Environmental Protection Agency ("EPA" or "the Agency") promulgated the revised National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 CFR part 300, on July 16, 1982 (47 FR 31180) pursuant to CERCLA section 105 and Executive Order 12316 (46 FR 42237, August 20, 1981). The NCP, further revised by EPA on September 16, 1985 (50 FR 37624 and November 20, 1985 (50 FR 47912), sets forth guidelines and procedures needed to respond under CERCLA to releases and threatened releases of hazardous substances, pollutants, or contaminants. On March 8, 1990 (55 FR 8666), EPA revised the NCP in response to SARA.

Section 105(a)(8)(A) of CERCLA, as amended by SARA, requires that the NCP include "criteria for determining priorities among releases or threatened releases throughout the United States for the purpose of taking remedial action and, to the extent practicable taking into account the potential urgency of such action, for the purpose of taking removal action." Removal action involves cleanup or other actions that are taken in response to releases or threats of releases on a short-term or temporary basis (CERCLA section 101(23)). Remedial action tends to be long-term in nature and involves response actions that are consistent with a permanent remedy for a release (CERCLA section 101(24)). Criteria for determining priorities for possible remedial actions financed by the Trust Fund established under CERCLA are included in the Hazard Ranking System ("HRS"), which EPA promulgated as appendix A of the NCP (47 FR 31219, July 16, 1982).

On December 23, 1988 (53 FR 51962), EPA proposed revisions to the HRS in response to CERCLA section 105(c), added by SARA. EPA intends to issue the revised HRS as soon as possible. However, until the revised HRS is in effect, EPA will continue to use the current HRS in accordance with CERCLA section 105(c)(1) and Congressional intent, as explained in 54 FR 13296 (March 31, 1989).

Based in large part on the HRS criteria, and pursuant to section 105(a)(8)(B) of CERCLA, as amended by SARA, EPA prepared a list of national priorities among the known releases or threatened releases of hazardous substances, pollutant, or contaminants throughout the United States (the "National Priorities List" or "NPL"). The list has been promulgated as appendix B of the NCP. A site can undergo CERCLA-financed remedial action only after it is placed on the NPL, as provided in the NCP at 40 CFR 300.425(b)(1) (55 FR 8845, March 8, 1990). As CERCLA section 105(a)(8)(b) states, the NPL is a listing of "releases or threatened releases" of hazardous substances, pollutants, or contaminants. For simplicity, the discussion below may refer to these releases or threatened releases" simply as "releases", "facilities", or "sites".

An original NPL of 406 sites was promulgated on September 8, 1983 (48 FR 40658). Pursuant to CERCLA section 105(a)(8)(B), which requires that the NPL be revised at least annually, the NPL has been updated periodically, most recently on March 14, 1990 (55 FR 9888). The Agency also has proposed adding new sites to the NPL, most recently on October 28, 1989 (54 FR 43778).

EPA may delete sites from the NPL when no further response is appropriate, as provided in the NCP at 40 CFR 300.425(e) (55 FR 8845, March 8, 1990). To date, the Agency has deleted 29 sites from the final NPL, most recently on May 31, 1990 (55 FR 22030), when Reeser's Landfill, Upper Macungie Township, Pennsylvania, was deleted.

This rule adds 108 sites, including 23 Federal facility sites, to the NPL, and removes 10 sites from the proposed NPL, including one Federal facility site. Of the 10 sites being removed, seven have HRS scores below 28.50 and the other three can be addressed under corrective action authorities of Subtitle C of the Resource Conservation and Recovery Act (RCRA). EPA has carefully considered public comments submitted for the sites in this final rule and has made certain modifications in response to those comments. This rule results in a final NPL of 1,187 sites, 116 of them in the Federal section; 20 sites remain in proposed status, none of them in the Federal section. With these changes, final and proposed sites now total 1,207.

Information Available to the Public

The Headquarters and Regional public dockets for the NPL (see **ADDRESSES** portion of this notice) contain documents relating to the evaluation and scoring of sites in this final rule. The dockets are available for viewing, by appointment only, after the appearance of this notice. The hours of operation for the Headquarters docket are from 9 a.m. to 4 p.m., Monday through Friday, excluding Federal holidays. Please contact individual Regional dockets for hours.

The Headquarters docket contains HRS score sheets for each final site; a Documentation Record for each site describing the information used to compute the score; pertinent information for any site affected by special study waste or other requirements, or RCRA or other listing policies; a list of documents referenced in the Documentation Record; comments received; and the Agency's response to those comments. The Agency's responses are contained in the "Support Document for the Revised National Priorities List Final Rule—August 1990."

Each Regional docket includes all information available in the Headquarters docket for sites in that Region, as well as the actual reference documents, which contain the data principally relied upon by EPA in calculating or evaluating the HRS scores for sites in that Region. These reference documents are available only in the Regional dockets. They may be viewed, by appointment only, in the appropriate Regional Docket or Superfund Branch Office. Requests for copies may be directed to the appropriate Regional Docket or Superfund Branch. An informal written request, rather than a

...sl request, should be the ordinary procedure for obtaining copies of any of these documents.

II. Purpose and Implementation of the NPL

Purpose

The primary purpose of the NPL is stated in the legislative history of CERCLA (Report of the Senate Committee on Environment and Public Works, Senate Rep. No. 96-848, 96th Cong., 2d Sess. 60 (1980)):

> The priority lists serve primarily informational purposes, identifying for the States and the public those facilities and sites or other releases which appear to warrant remedial actions. Inclusion of a facility or site on the list does not in itself reflect a judgment of the activities of its owner or operator. It does not require those persons to undertake any action, nor does it assign liability to any person. Subsequent government action in the form of remedial actions or enforcement actions will be necessary in order to do so, and these actions will be attended by all appropriate procedural safeguards.

The purpose of the NPL, therefore, is primarily to serve as an informational and management tool. The initial identification of a site for the NPL is intended primarily to guide EPA in determining which sites warrant further investigation to assess the nature and extent of the public health and environmental risks associated with the site and to determine what CERCLA-financed remedial action(s), if any, may be appropriate. The NPL also serves to notify the public of sites EPA believes warrant further investigation.

Federal facility sites are eligible for the NPL pursuant to the NCP at 40 CFR 300.425(b)(3) (55 FR 8845, March 8, 1990). However, section 111(e)(3) of CERCLA, as amended by SARA, limits the expenditure of CERCLA monies at federally-owned facilities. Federal facility sites also are subject to the requirements of CERCLA section 120, added by SARA.

Implementation

A site may undergo remedial action financed by the Trust Fund established under CERCLA ("Superfund") only after it is placed on the final NPL as outlined in the NCP at 40 CFR 300.425(b)(1) (55 FR 8845, March 8, 1990). However, EPA may take enforcement actions under CERCLA or other applicable statutes against responsible parties regardless of whether the site is on the NPL, although, as a practical matter, the focus of EPA's enforcement actions has been and will continue to be on NPL sites. Similarly, in the case of removal actions, EPA has the authority to act at any site, whether listed or not, that meets the criteria of the NCP at 40 CFR 300.415 (55 FR 8842, March 8, 1990).

EPA's policy is to pursue cleanup of NPL sites using the appropriate response and/or enforcement actions available to the Agency, including authorities other than CERCLA. Listing a site will serve as notice to any potentially responsible party that the Agency may initiate CERCLA-financed remedial action. The Agency will decide on a site-by-site basis whether to take enforcement or other action under CERCLA or other authorities, proceed directly with CERCLA-financed response actions and seek to recover response costs after cleanup, or do both. To the extent feasible, once sites are on the NPL, EPA will determine high-priority candidates for Superfund-financed response action and/or enforcement action through both State and Federal initiatives. These determinations will take into account which approach is more likely to most expeditiously accomplish cleanup of the site while using CERCLA's limited resources as efficiently as possible.

Remedial response actions will not necessarily be funded in the same order as a site's ranking on the NPL—that is, its HRS score. The information collected to develop HRS scores is not sufficient in itself to determine either the extent of contamination or the appropriate response for a particular site. EPA relies on further, more detailed studies in the remedial investigation/feasibility study (RI/FS) to address these concerns.

The RI/FS determines the nature and extent of the threat posed by the release or threatened release. It also takes into account the amount of contaminants in the environment, the risk to affected populations and environment, the cost to correct problems at the site, and the response actions that have been taken by potentially responsible parties or others. Decisions on the type and extent of action, if any, to be taken at these sites are made in accordance with the criteria contained in subpart E of the NCP (55 FR 8839, March 8, 1990). After conducting these additional studies, EPA may conclude that it is not desirable to initiate a CERCLA remedial action at some sites on the NPL because of more pressing needs at other sites, or because a private party cleanup is already underway pursuant to an enforcement action. Given the limited resources available in the Trust Fund, the Agency must carefully balance the relative needs for response at the numerous sites it has studied. It is also possible that EPA will conclude after further analysis that the site does not warrant remedial action.

Revisions to the NPL such as today's rulemaking may move some previously listed sites to a lower position on the NPL. However, if EPA has initiated action such as an RI/FS at a site, it does not intend to cease such actions to determine if a subsequently listed site should have a higher priority for funding. Rather, the Agency will continue funding site studies and remedial actions once they have been initiated, even if higher-scoring sites are later added to the NPL.

RI/FS at Proposed Sites

An RI/FS may be performed at proposed sites (or even sites that have not yet been proposed for the NPL) pursuant to the Agency's removal authority under CERCLA, as outlined in the NCP at 40CFR 300.425(b)(1) (55 FR 8845, March 8, 1990). Section 101(23) of CERCLA defines "remove" or "removal" to include "such actions as may be necessary to monitor, assess and evaluate the release or threat of release * * *." The definition of "removal" also includes "action taken under section 104(b) of this Act * * *," which authorizes the Agency to perform studies, investigations, and other information-gathering activities.

Although an RI/FS generally is conducted at a site after the site has been placed on the NPL, in a number of circumstances the Agency elects to conduct an RI/FS at a proposed NPL site in preparation for a possible CERCLA-financed remedial action, such as when the Agency believes that a delay may create unnecessary risks to human health or the environment. In addition, the Agency may conduct an RI/FS to assist in determining whether to conduct a removal or enforcement action at a site.

Facility (Site) Boundaries

The NPL does not describe releases in precise geographical terms, and the Agency believes that it would be neither feasible nor consistent with the limited purpose of the NPL (as the mere identification of releases), for it to do so. CERCLA section 105(a)(8)(B) directs EPA to list national priorities among the known "releases or threatened releases" of hazardous substances. Thus, the purpose of the NPL is merely to identify releases of hazardous substances that are priorities for further evaluation. Although CERCLA "facility" is broadly defined to include any area where a hazardous substance release has "come to be located" (CERCLA section 101(9)), the listing process itself is not intended to define or reflect the boundaries of

such facilities or releases.[1] The names of sites are provided for purposes of identification only; the sites are not limited to the boundaries of properties that may be referred to in the name. Of course, HRS data upon which listing is based will, to some extent, describe which release is at issue; that is, the NPL site would include all releases evaluated as part of that HRS analysis (including noncontiguous releases evaluated under the NPL aggregation policy, *see* 48 FR 40660 (September 8, 1983)).

EPA regulations do provide that the "nature and extent of the threat presented by a "release" will be determined by an RI/FS as more information is developed on site contamination (40 CFR 300.430(d)(2) (55 FR 8847, March 8, 1990)). During the RI/FS process, the release may be found to be larger or smaller than was originally known, as more is learned about the source and the migration of the contamination. However, this inquiry focuses on an evaluation of the threat posed; the boundaries of the release need not be defined, and in any event are independent of listing. Moreover, it generally is impossible to discover the full extent of where the contamination "has come to be located" before all necessary studies and remedial work are completed at a site; indeed, the boundaries of the contamination can be expected to change over time. Thus, in most cases, it will be impossible to describe the boundaries of a release with certainty.

For these reasons, the NPL need not be amended if further research into the extent of the contamination expands the apparent boundaries of the release. As discussed above, the NPL is only of limited significance, as it does not assign liability to any party or to the owner of any specific property. *See* Report of the Senate Committee on Environment and Public Works, Senate Rep. No. 96-848, 96th Cong., 2d Sess. 60 (1980), quoted at 48FR 40659 (September 8, 1983). If a party contests liability for releases on discrete parcels of property, it may do so if and when the Agency brings an action against that party to recover costs or to compel a response action at that property.

At the same time, however, the RI/FS or the Record of Decision (which defines the remedy selected) may offer a useful indication to the public of the areas of contamination at which the Agency is considering taking a response action, based on information known at that time. For example, EPA may evaluate (and list) a release over a 400-acre area, but the Record of Decision may select a remedy over 100 acres only. This information may be useful to a landowner seeking to sell the other 300 acres, but it would result in no formal change in the fact that a release is included on the NPL. The landowner (and the public) also should note in such a case that if further study (or the remedial construction itself) reveals that the contamination is located on or has spread to other areas, the Agency may address those areas as well.

This view of the NPL as an initial identification of a release that is not subject to constant re-evaluation is consistent with the Agency's policy of not rescoring NPL sites, or as stated in 49 FR 37081, September 21, 1984:

> EPA recognizes that the NPL process cannot be perfect, and it is possible that errors exist or that new data will alter previous assumptions. Once the initial scoring effort is complete, however, the focus of EPA activity must be on investigating sites in detail and determining the appropriate response. New data or errors can be considered in that process * * * [T]he NPL serves as a guide to EPA and does not determine liability or the need for response.

III. NPL Update Process

There are three mechanisms for placing sites on the NPL. The principal mechanism is the application of the HRS. The HRS serves as a screening device to evaluate the relative potential of uncontrolled hazardous substances to cause human health or safety problems, or ecological or environmental damage. The HRS score is calculated by estimating risks presented in three potential "pathways" of human or environmental exposure: Ground water, surface water, and air. Within each pathway of exposure, the HRS considers three categories of factors "that are designed to encompass most aspects of the likelihood of exposure to a hazardous substance through a release and the magnitude or degree of harm from such exposure": (1) Factors that indicate the presence or likelihood of a release to the environment; (2) factors that indicate the nature and quantity of the substances presenting the potential threat; and (3) factors that indicate the human or environmental "targets" potentially at risk from the site. Factors within each of these three categories are assigned a numerical value according to a set scale. Once numerical values are computed for each factor, the HRS uses mathematical formulas that reflect the relative importance and interrelationships of the various factors to arrive at a final site score on a scale of 0 to 100. The resultant HRS score represents an estimate of the relative "probability and magnitude of harm to the human population or sensitive environment from exposure to hazardous substances as a result of the contamination of ground water, surface water, or air" (47 FR 31180, July 16, 1982). Those sites that score 28.50 or greater on the HRS are eligible for the NPL.

Under the second mechanism for adding sites to the NPL, each State may designate a single site as its top priority, regardless of the HRS score. This mechanism is provided by section 105(a)(8)(B) of CERCLA, as amended by SARA, which requires that, to the extent practicable, the NPL include within the 100 highest priorities, one facility designated by each State representing the greatest danger to public health, welfare, or the environment among known facilities in the State.

The third mechanism for listing, included in the NCP at 40 CFR 300.425(c)(3) (55 FR 8845, March 8, 1990), has been used only in rare instances. It allows certain sites with HRS scores below 28.50 to be eligible for the NPL if all of the following occur:

- The Agency for Toxic Substances and Disease Registry (ATSDR) of the U.S. Department of Health and Human Services has issued a health advisory that recommends dissociation of individuals from the release.
- EPA determines that the release poses a significant threat to public health.
- EPA anticipates that it will be more cost-effective to use its remedial authority than to use its removal authority to respond to the release.

All of the sites in today's final rule have been placed on the NPL based on their HRS scores.

States have the primary responsibility for identifying non-Federal sites, computing HRS scores, and submitting candidate sites to the EPA Regional Offices. EPA Regional Offices conduct a quality control review of the States' candidate sites, and may assist in investigating, sampling, monitoring, and scoring sites. Regional Offices also may consider candidate sites in addition to those submitted by States. EPA Headquarters conducts further quality assurance audits to ensure accuracy and consistency among the various EPA and State offices participating in the scoring. The Agency then proposes the sites that meet one of the three criteria for listing (as well as statutory requirements and EPA's listing policies) and solicits public

[1] Although CERCLA section 101(9) sets out the definition of "facility" and not "release," those terms are often used interchangeably. (See CERCLA section 105(a)(8)(B), which defines the NPL as a list of "releases" as well as of the highest priority "facilities.") (For ease of reference, EPA also uses the term "site" interchangeably with "release" and "facility.")

comment on the proposal. Based on these comments and further review by EPA, the Agency determines final HRS scores and places those sites that still qualify on the final NPL.

IV. Statutory Requirements and Listing Policies

CERCLA restricts EPA's authority to respond to certain categories of releases of hazardous substances, pollutants, or contaminants by expressly excluding some substances, such as petroleum, from the response program. In addition, CERCLA section 105(a)(8)(B) directs EPA to list priority sites "among" the known releases or threatened releases of hazardous substances, pollutants, or contaminants, and section 105(a)(8)(A) directs EPA to consider certain enumerated and "other appropriate" factors in doing so. Thus, as a matter of policy, EPA has the discretion not to use CERCLA to respond to certain types of releases. Where other authorities exist, placing the site on the NPL for possible remedial action under CERCLA may not be appropriate. Therefore, EPA has chosen to defer certain types of sites from the NPL even though CERCLA may provide authority to respond. For example, EPA has chosen not to list sites that result from contamination associated with facilities licensed by the Nuclear Regulatory Commission (NRC), on the grounds that NRC has the authority and expertise to clean up releases from those facilities (48 FR 40661, September 8, 1983). If, however, the Agency later determines that sites deferred as a matter of policy are not being properly responded to, the Agency may place them on the NPL.

The Agency has solicited comment on a policy to expand deferral to other Federal and State authorities (53 FR 51415, December 21, 1988); however, that policy is not currently in effect and has not been applied to sites in this rule. The Agency has committed not to implement any part of an expanded deferral policy until public and Congressional concerns have been fully reviewed and analyzed, and a decision reached on whether or not to implement such a policy.

The listing policies and statutory requirements of relevance to this final rule cover Resource Conservation and Recovery Act (RCRA) (U.S.C. 6901-6991i) sites, Federal facility sites, sites with "special study wastes," and radioactive mining waste sites. These and other listing policies and statutory requirements have been explained in previous rulemakings, the latest being February 21, 1990 (55 FR 6154).

Releases From Resource Conservation and Recovery Act (RCRA) Sites

On June 10, 1986 (51 FR 21054), EPA announced a decision on components of a policy for the listing on the NPL of several categories of non-Federal sites subject to RCRA subtitle C corrective action authorities. Under the policy, sites not subject to RCRA subtitle C corrective action authorities will continue to be placed on the NPL. Examples of such sites include:

- Facilities that ceased treating, storing, or disposing of hazardous waste prior to November 19, 1980 (the effective date of Phase I of the Subtitle C regulations) and to which the RCRA corrective action or other authorities of Subtitle C cannot be applied.
- Sites at which only materials exempted from the statutory or regulatory definition of solid waste or hazardous waste are managed.
- Contamination areas resulting from the activities of RCRA hazardous waste handlers to which RCRA Subtitle C corrective action authorities do not apply, such as hazardous waste generators or transporters, which are not required to have Interim Status or a final RCRA permit.

Further, the policy stated that certain RCRA sites at which subtitle C corrective action authorities are available also may be listed if they meet the criterion for listing (i.e., an HRS score of 28.50 or greater) and they fall within one of the following categories:

- Facilities whose owners have demonstrated an inability to finance corrective action as evidenced by their invocation of the bankruptcy laws.
- Facilities that have lost authorization to operate, and for which there are additional indications that the owner or operator will be unwilling to undertake corrective action.
- Facilities, analyzed on a case-by-case basis, whose owners or operators have a clear history of unwillingness to undertake corrective action.

On August 9, 1988 (53 FR 30006), EPA announced a policy for determining whether RCRA facilities are unwilling to perform corrective actions, and therefore should be proposed to the NPL. Additionally, on August 9, 1988 (53 FR 30002), EPA requested comment on a draft policy for determining when an owner/operator should be considered unable to pay for addressing the contamination at a RCRA-regulated site; that draft policy is still under review.

On June 24, 1988 (53 FR 23978), EPA announced its intent to list several other categories of RCRA facilities that the Agency considers appropriate for the NPL. These categories are non- or late filers, converters (i.e., facilities whose part A permits have been withdrawn), protective filers, and sites holding RCRA permits issued before enactment of the Hazardous and Solid Waste Amendments (HSWA) of 1984. (Further definition of these terms is contained in the June 24, 1988 policy announcement.) Consistent with this policy, 23 RCRA sites were placed on the final NPL on October 4, 1989 (54 FR 41000).

In this final rule, EPA is adding to the NPL five sites that are subject to RCRA subtitle C corrective action authorities. These sites are being placed on the NPL under the NPL/RCRA policy. Three sites are converters, one site has lost its RCRA authorization to operate and appears unwilling to undertake corrective action, and one site has contamination that may not be addressable under RCRA. Listing a site because of an unresolved question as to whether RCRA subtitle C corrective action authorities apply to all contamination associated with the site is consistent with EPA's NPL/RCRA policy (53 FR 23983, June 24, 1988).

In addition, EPA is not listing three sites under the NPL/RCRA policy because they can be addressed under RCRA Subtitle C corrective action authorities. Of these, one site was proposed as a pre-HSWA permittee, but is not being listed because the pre-HSWA permit has expired and the owner/operator is now subject to a new permit which includes corrective action requirements (see 54 FR 41008, October 4, 1989). Another site is a converter, but is not being listed because the owner/operator has agreed to corrective action under a RCRA consent corrective action order (see 54 FR 41006, October 4, 1989). The third site is a late filer, but is not being listed because the site has come within the RCRA system and demonstrated a history of compliance with RCRA regulations (see 54 FR 41006, October 4, 1989).

Releases From Federal Facility Sites

On March 13, 1989 (54 FR 10520), the Agency announced a policy for listing Federal facility sites, if they meet the prescribed eligibility criteria (e.g., an HRS score of 28.50 or greater), even if the Federal facility also is subject to the corrective action authorities of RCRA subtitle C. In that way, cleanup, if appropriate, could be affected at those sites under CERCLA.

Federal facility sites are placed in a separate section of the NPL. This rule adds 23 Federal facility sites to the final NPL and drops one, bringing the total number of final Federal facilities sites to 116. No Federal facility sites remain proposed to the NPL.

Releases of Radioactive Materials

CERCLA section 101(22) excludes several types of releases of radioactive materials from the statutory definition of "release." These releases are therefore not eligible for CERCLA response actions or the NPL. The exclusions apply to (1) releases of source, by-product, or special nuclear material from a nuclear incident if these releases are subject to financial protection requirements under section 170 of the Atomic Energy Act, and (2) any release of source, by-product, or special nuclear material from any processing site designated under the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA). Accordingly, such radioactive releases have not been considered eligible for the NPL.

As a policy matter, EPA has also chosen not to list releases of source, by-product, or special nuclear material from any facility with a current license issued by the NRC, on the grounds that the NRC has full authority to require cleanup of releases from such facilities (48 FR 40658, September 8, 1983). EPA will, however, list releases from facilities that hold a current license issued by a State pursuant to an agreement between the State and the NRC under section 274 of the Atomic Energy Act. Facilities whose licenses are no longer in effect are also considered for listing.

In this final rule, EPA is adding to the NPL three sites with radioactive releases that meet EPA's criteria for the NPL. None of the three sites has releases that are excluded by statute from the NPL. The sites are also not excluded by EPA's NPL/NRC policy because they were not contaminated as a result of a NRC-licensed operation.

Releases of Special Study Wastes

Section 105(g) of CERCLA, as amended by SARA, requires EPA to consider certain factors before adding sites involving RCRA "special study wastes" to the NPL. Section 105(g) applies to sites that (1) were not on or proposed for the NPL as of October 17, 1986 and (2) contain significant quantities of special study wastes as defined under RCRA sections 3001(b)(2) [drilling fluids], 3001(b)(3)(A)(ii) [mining wastes], and 3001(b)(3)(A)(iii) [cement kiln dusts]. Before these sites can be added to the NPL, section 105(g) requires that the following information be considered:

- The extent to which the HRS score for the facility is affected by the presence of the special study waste at or released from the facility.
- Available information as to the quantity, toxicity, and concentration of hazardous substances that are constituents of any special study waste at, or released from, the facility; the extent of or potential for release of such hazardous constituents; the exposure or potential exposure to human population and environment; and the degree of hazard to human health or the environment posed by the release of such hazardous constituents at the facility.

This final rule includes 14 sites containing or potentially containing special study wastes subject to section 105(g). EPA has placed in the dockets an addendum that evaluates for each site the information called for in section 105(g). The addenda indicate that the special study wastes present a threat to human health and the environment, and that the sites should be added to the NPL.

CERCLA section 125, as amended by SARA, addresses specific special study wastes described in RCRA section 3001(b)(3)(A)(i) [fly ash and related wastes]. No sites in this rule are subject to section 125.

Response to Public Comments on Special Study Waste Sites

When EPA proposed to include on the NPL the special study waste sites in this final rule, the Agency received several public comments. The Agency's responses to site-specific comments are contained in the "Support Document for the Revised National Priorities List Final Rule—August 1990." (See section V of this final rule).

EPA also received general (i.e., non-site-specific) comments from one organization concerning the Agency's evaluation of sites with coal tar special study waste. A summary of the issues raised in these comments and the Agency's response was contained in the final rule published on February 21, 1990 (55 FR 6158). EPA's response generally applies to the coal tar and other special study waste sites included in this final rule as well.

V. Disposition of Sites in Today's Final Rule

This final rule promulgates 106 sites (Table 1) and removes 10 sites from several proposed rulemakings. These 116 sites are from the following proposed updates:

- Update #2 (49 FR 40320, October 15, 1984): 10 sites
- Update #5 (51 FR 21099, June 10, 1986): 2 sites
- Update #6 (52 FR 2492, January 22, 1987): 6 sites
- Update #7 (53 FR 23988, June 24, 1988): 54 sites
- Update #8 (54 FR 19526, May 5, 1989): 4 sites
- Update #9 (54 FR 29820, July 14, 1989): 17 sites
- Update #10 (54 FR 43776, October 26, 1989): 23 sites

EPA read all comments received on these sites, including late comments. In past rules, EPA responded even to late comments. However, given the volume and number of late comments received and the need to make final decisions on all currently proposed sites prior to the date that the revised HRS takes effect, EPA was not able to respond to all late comments received for sites in this rule. EPA has responded (in the Support Document) to those comments postmarked no later than October 31, 1988 for all sites included in this final rule that were proposed in Updates #2, 5, 6, and 7, to those comments postmarked no later than September 12, 1989 for sites in this final rule that were proposed in Update #8, to those comments postmarked no later than October 3, 1989 for sites in this final rule that were proposed in Update #9, and to those comments postmarked no later than February 6, 1990 for sites in this final rule that were proposed in Update #10. (EPA had previously indicated that it may no longer be able to consider late comments (53 FR 23990, June 24, 1988 and, most recently 54 FR 43776, October 26, 1989)). Although EPA has not responded to all late comments, it has read all late comments and endeavored to respond in the Support Document to those late comments that bring to the Agency's attention a fundamental error in the scoring of a site. In addition, the Agency has routinely responded to late comments resulting from EPA correspondence that provided commenters with more recent data or requested that the commenters be more specific in their comments.

TABLE 1.—NATIONAL PRIORITIES LIST, NEW FINAL SITES (BY RANK)

[August 1990]

NPL		St	Site name	City/county
Gr [1]	Rank			
2	68	IA	Lehigh Portland Cement Co.	Mason City.
2	72	ID	Eastern Michaud Flats Contamin.	Pocatello.
2	74	IA	Northwestern States Portland Cem.	Mason City.
2	78	PA	Salford Quarry	Salford Township.
3	114	ID	Monsanto Chemical (Soda Springs).	Soda Springs.
4	169	WA	Seattle Msw Landfill (Kent Highlands).	Kent.

TABLE 1.—NATIONAL PRIORITIES LIST, NEW FINAL SITES (BY RANK)—Continued

[August 1990]

NPL Gr [1]	NPL Rank	St	Site name	City/county
4	164	IL	Beloit Corp	Rockton.
4	178	IN	Whiteford Sales&Ser/ Nationalease.	South Bend.
4	188	CA	Industrial Waste Processing.	Fresno.
5	205	IL	MIG/Dewane Landfill.	Belvidere.
5	223	WI	Better Brite Chrome & Zinc Shops.	DePere.
6	284	IA	Peoples Natural Gas Co.	Dubuque.
6	285	MO	Oronogo-Duenweg Mining Belt.	Jasper County.
6	293	AR	Monroe Auto Equip (Parsgould Plt).	Parsgould.
6	295	IA	E.I. Du Pont (County Rd X23).	West Point.
7	332	AL	T.H. Agricul & Nutri (Montgomery).	Montgomery
7	335	CA	Sulphur Bank Mercury Mine.	Clear Lake.
7	339	NM	Prewitt Abandoned Refinery.	Prewitt.
7	344	MI	Peerless Plating Co.	Muskegon.
7	347	KY	Fort Hartford Coal Co Stone Quarry.	Olaton.
8	358	IA	White Farm Equipment Co. Dump.	Charles City.
9	413	PA	Ohio River Park	Neville Island.
9	414	GA	Woodfolk Chemical Works, Inc.	Fort Valley
9	416	IN	Tippecanoe Sanitary Landfill, Inc.	Lafayette.
9	417	IN	Conrail Rail Yard (Elkhart).	Elkhart.
9	423	MN	Dakhue Sanitary Landfill.	Cannon Falls.
9	428	SD	Williams Pipe Line Disposal Plt.	Sioux Falls.
9	436	AK	Arctic Surplus	Fairbanks.
9	447	UT	Sharon Steel (Midvale Tailings).	Midvale.
10	453	PA	Westinghouse Elec (Sharon Plant).	Sharon.
11	505	CA	Western Pacific Railroad Co.	Oroville.
11	513	IL	Kerr-McGee (Reed-Keppler Park).	West Chicago.
11	518	FL	Woodbury Chemical (Princeton Plant).	Princeton.
11	521	AZ	Apache Powder Co.	St. David.

TABLE 1.—NATIONAL PRIORITIES LIST, NEW FINAL SITES (BY RANK)—Continued

[August 1990]

NPL Gr [1]	NPL Rank	St	Site name	City/county
11	522	NV	Carson River Mercury Site.	Lyon/ Churchill Cnty.
11	542	TX	Tex-Tin Corp	Texas City.
12	554	IL	Kerr-McGee (Residential Areas).	W Chic/ DuPage Cnty.
12	564	IA	Fairfield Coal Gasification Plant.	Fairfield.
12	570	NJ	Chemical insecticide Corp.	Edison Township.
12	573	DE	Cham-Solv, Inc	Cheswold.
12	575	FL	Madison County Sanitary Landfill.	Madison.
12	584	CO	Chemical Sales Co.	Denver.
12	587	CA	Hassel Corp	Livermore.
12	588	CA	Crazy Horse Sanitary Landfill.	Salinas.
12	589	OR	Union Pacific Railroad Tie Treat.	The Dalles.
13	636	VA	Atlas Corp	Portsmouth.
13	637	MI	Allied Paper/ Portage Cit/ Kalamaz R.	Kalamazoo.
13	640	WA	Centralia Municipal Landfill.	Centralia.
14	660	GA	Diamond Shamrock Corp. Landfill.	Cedartown.
14	662	CT	Cheshire Ground Water Contamin.	Cheshire.
14	699	FL	B&B Chemical Co., Inc.	Hialeah.
15	703	FL	BMI-Textron	Lake Park.
15	709	IL	Kerr-McGee (Sewage Treat Plant).	West Chicago.
15	748	KY	Caldwell Lace Leather Co., Inc.	Auburn.
15	750	IL	Adams County Quincy Landfills 2&3.	Quincy.
16	791	LA	Combustion, Inc.	Denham Springs.
16	799	IA	Farmers' Mutual Cooperative.	Hospers.
17	806	IA	Sheller-Globe Corp. Disposal.	Keokuk.
17	814	DE	Kent County Landfill (Houston).	Houston.
17	826	DE	Koppers Co., Inc. (Newport Plant).	Newport.
17	829	NJ	Lodi Municipal Well.	Lodi.
17	838	DE	Sealand Limited	Mount Pleasant.

TABLE 1.—NATIONAL PRIORITIES LIST, NEW FINAL SITES (BY RANK)—Continued

[August 1990]

NPL Gr [1]	NPL Rank	St	Site name	City/county
17	845	SC	Para-Chem Southern, Inc.	Simpsonville.
18	854	WA	North Market Street.	Spokane.
18	868	PA	Pasco Rail Yard	Pasco.
18	874	WY	Mystery Bridge Rd/U.S. Highway 20.	Evansville.
18	895	NE	Nebraska Ordnance Plant (Former).	Mead.
19	901	CA	Advanced Micro Devices (Bldg. 915).	Sunnyvale.
19	922	OH	Reilly Tar & Chemical (Dover Plnt).	Dover.
19	942	FL	Anaconda Aluminum/ Milgo Electron.	Miami.
19	950	TN	Murray-Ohio Mfg (Horseshoe Bend).	Lawrenceburg.
20	952	NJ	Higgins Disposal	Kingston.
20	990	MI	Cannelton Industries, Inc.	Sault Sainte Marie.
20	1000	NC	Havi-Duty Electric Co.	Goldsboro.
21	1003	MO	Westlake Landfill.	Bridgeton.
21	1022	NY	Sealand Restoration, Inc.	Lisbon.
21	1030	KY	Green River Disposal, Inc.	Maceo.
21	1034	IL	Central Illinois Public Serv Co.	Taylorville.
21	1045	PA	Dublin TCE Site	Dublin Borough.
21	1047	WI	Waste Management (Brookfield Lf).	Brookfield.
21	1049	NE	10th Street Site	Columbus.
22	1052	CA	Westline-Johnson Co. (Stewart Div).	Scotts Valley.
22	1053	CA	Intersil Inc./ Siemens Components.	Cupertino.

Number of New Final Sites: 83.

[1] Sites are placed in groups (Gr) corresponding to groups of 50 on the final NPL.

NATIONAL PRIORITIES LIST, FEDERAL FACILITY SITES, NEW FINAL (BY GROUP)

[August 1990]

NPL Gr 1	St	Site name	City/county
3	ID	Mountain Home Air Force Base.	Mountain Home.
3	WA	Bangor Naval Submarine Base.	Bilverdale.

NATIONAL PRIORITIES LIST, FEDERAL FACILITY SITES, NEW FINAL (BY GROUP)—Continued

[August 1990]

NPL Gr [1]	St	Site name	City/county
5	UT	Tooele Army Depot (North Area)	Tooele.
6	AK	Standard Steel & Met Sal Yd (USDOT).	Anchorage.
7	AK	Elmendorf Air Force Base.	Greater Anchorage Bor.
9	AK	Fort Wainwright	Fairbanks N Star Bor.
8	FL	Homestead Air Force Base.	Homestead.
10	TX	Air Force Plant #4 Gener Dynamics.	Fort Worth.
11	TX	Longhorn Army Ammunition Plant.	Karnack.
11	NJ	Federal Aviation Admin Tech Cent.	Atlantic County.
11	NM	Lee Acres Landfill (USDOI).	Farmington.
12	PA	Tobyhanna Army Depot.	Tobyhanna.
12	AZ	Luke Air Force Base	Glendale.
13	CT	New London Submarine Base.	New London.
13	CA	Tracy Defense Depot.	Tracy.
14	NY	Seneca Army Depot	Romulus.
16	KS	Fort Riley	Junction City.
17	CA	Edwards Air Force Base.	Kern County.
17	SD	Ellsworth Air Force Base.	Rapid City.
19	CA	Lawrence Livermore Lab-300 (USDOE).	Livermore.
21	NJ	Naval Weapons Stat Earle (Site A).	Colts Neck.
21	IA	Iowa Army Ammunition Plant.	Middletown.
22	HI	Schofield Barracks	Oahu.

Number of New Final Federal Facility Sites: 23.

[1] State top priority site.
[2] Sites are placed in groups (Gr) corresponding to groups of 50 on the final NPL.

Based on the comments received on the proposed sites, as well as investigation by EPA and the States (generally in response to comment) EPA recalculated the HRS scores for individual sites where appropriate. Where the public comments or additional information dropped a score below 28.50, the site has been removed from the NPL. EPA's response to site-specific public comments and explanations of any score changes made as a result of such comments are addressed in the "Support Document for the Revised National Priorities List Final Rule—August 1990."

RCRA Sites

Three sites are subject to subtitle C corrective action authorities, but the Part A permits have been withdrawn (converter states). These sites are being added to the final NPL consistent with the NPL/RCRA policy:

- Advanced Micro Devices (Building 915), Sunnyvale, California (converter)
- Hexcel Corp., Livermore, California (converter)
- Westinghouse Electric Corp. (Sharon Plant), Sharon, Pennsylvania (converter)

One site is being listed, consistent with the NPL/RCRA policy, because the contamination may not be addressable under RCRA subtitle C corrective action authorities:

- Apache Powder Co., St. David, Arizona

Based on the NPL/RCRA policy announced on June 10, 1986 (51 FR 21057) and in effect at the time of proposal, one site is being listed because it has lost its RCRA authorization to operate and appears unwilling to undertake corrective action:

- Chem-Solv, Inc., Cheswold, Delaware

One site is not being listed because it is a late-filer that has come within the RCRA system and demonstrated a history of compliance with RCRA regulations:

- Kearney-KFF, Stockton, California (late filer)

One site is not being listed because it now is subject to a post-HSWA permit that includes corrective action requirements:

- Solvent Service, Inc., San Jose, California

One site is not being listed because it is a converter that has agreed to corrective action under a RCRA consent corrective action order:

- Warner Electric Brake & Clutch Co., Roscoe, Illinois

Documentation supporting EPA's decisions on these sites is available in the Support Document.

Federal Facility Sites

This final rule adds 23 Federal facility sites to the NPL (Table 1) and drops 1 from the proposed NPL.

Radioactive Release Sites

Three sites with radioactive releases are being added to the final NPL consistent with the NPL/NRC policy because the sites were not contaminated as a result of a NRC-licensed operation:

- Kerr-McGee (Reed-Keppler Park), West Chicago, Illinois
- Kerr-McGee (Residential Areas), West Chicago/DuPage County, Illinois
- Kerr-McGee (Sewage Treatment Plant), West Chicago, Illinois

Special Study Waste Sites

Fourteen sites containing or possibly containing special study wastes are being added to the NPL in this rule.

- Sulphur Bank Mercury Mine, Clear Lake, California (mining wastes)
- Sealand Limited, Mount Pleasant, Delaware (coal tar wastes)
- Eastern Michaud Flats Contamination, Pocatello, Idaho (mining wastes)
- Monsanto Chemical Co. (Soda Springs Plant), Soda Springs, Idaho (mining wastes)
- Central Illinois Public Service Co., Taylorville, Illinois (coal tar wastes)
- Fairfield Coal Gasification Plant, Fairfield, Iowa (coal tar wastes)
- Lehigh Portland Cement Co., Mason City, Iowa (cement kiln dust)
- Northwestern States Portland Cement Co., Mason City, Iowa (cement kiln dust)
- Peoples Natural Gas Co., Dubuque, Iowa (coal tar wastes)
- Oronogo-Duenweg Mining Belt, Jasper County, Missouri (mining wastes)
- Lee Acres Landfill (USDOI), Farmington, New Mexico (drilling muds and produced waters)
- Carson River Mercury Site, Lyon/Churchill Counties, Nevada (mining wastes)
- Reilly Tar & Chemical Corp. (Dover Plant), Dover, Ohio (coal tar wastes)
- Tex-Tin Corp., Texas City, Texas (mining wastes)

Score Revisions

EPA has revised the HRS scores for 37 sites based on its review of comments and additional information developed by EPA and the States (Table 2). Some of the changes have placed the sites in different groups of 50 sites. For seven of these sites, the public comments have resulted in scores below the cut-off of 28.50. Accordingly, these sites are being dropped from the proposed NPL at this time:

- Magnolia City Landfill, Magnolia, Arkansas
- Concord Naval Weapons Station, Concord, California
- Ford Motor Co. (Sludge Lagoon), Ypsilanti, Michigan
- Gautier Oil Co., Inc., Gautier, Mississippi
- Sunrey Oil Co. Refinery, Allen, Oklahoma
- Rio Grande Oil Co. Refinery, Sour Lake, Texas
- Fort Howard Paper Co. (Sludge Lagoons), Green Bay, Wisconsin

TABLE 2.—SITES WITH HRS SCORE CHANGES

State/site name	Location	HRS score	
		Proposed	Final
AR/Magnolia City Landfill	Magnolia	28.49	(1)
AZ/Apache Powder Co.	St. David	48.74	30.09

TABLE 2.—SITES WITH HRS SCORE CHANGES—Continued

State/site name	Location	HRS score	
		Proposed	Final
CA/Concord Naval Weapon Station	Concord	29.82	(1)
CA/Crazy Horse Sanitary Landfill	Salinas	39.82	37.93
CA/Intersil Inc./Siemens Components	Cupertino	37.79	28.90
CA/Sulphur Bank Mercury Mine	Clear Lake	46.59	44.42
CA/Tracy Defense Depot	Tracy	31.12	37.16
CA/Watkins-Johnson Co. (Stewart Division)	Scotts Valley	44.46	28.90
CT/Cheshire Ground Water Contamination	Cheshire	36.11	35.57
DE/Kent County Landfill (Houston)	Houston	38.11	33.32
FL/BMI-Textron	Lake Park	37.93	35.34
FL/Woodbury Chemical Co (Princeton Plant)	Princeton	39.78	39.43
IA/Fairfield Coal Gasification Plant	Fairfield	33.78	36.05
IA/Northwestern States Portland Cement Co.	Mason City	58.18	57.80
IA/Shaller-Globe Corp. Disposal	Keokuk	35.42	30.66
IA/White Farm Equipment Co. Dump	Charles City	53.42	43.40
IL/Beloit Corp.	Rockton	40.15	52.08
IL/Central Illinois Public Service Co.	Taylorville	48.91	28.95
KY/Green River Disposal, Inc.	Maceo	31.24	29.12
MI/Ford Motor Co. (Sludge Lagoon)	Ypsilanti	31.56	(1)
MI/Peerless Plating Co.	Muskegon	38.95	43.94
MO/Oronogo-Duenweg Mining Belt	Jasper County	46.33	46.20
MS/Gautier Oil Co., Inc.	Gautier	39.79	(1)
NC/Henry-Duty Electric Co.	Goldsboro	32.06	29.98
NJ/Higgins Disposal	Kingston	36.73	30.87
NJ/Naval Weapons Station Earle (Site A)	Colts Neck	37.21	29.65
NM/Lee Acres Landfill (USDOI)	Farmington	37.01	39.37
NM/Prewitt Abandoned Refinery	Prewitt	29.49	44.24
NY/Seneca Army Depot	Romulus	37.90	35.52
OK/Sunray Oil Co. Refinery	Allen	35.47	(1)
PA/Ohio River Park	Neville Island	49.27	42.24

TABLE 2.—SITES WITH HRS SCORE CHANGES—Continued

State/site name	Location	HRS score	
		Proposed	Final
TN/Murray-Ohio Manufacturing Co. (Horseshoe Bend Dump)	Lawrenceburg	40.27	30.93
TX/Rio Grande Oil Co. Refinery	Sour Lake	36.80	(1)
UT/Sharon Steel Corp. (Midvale Tailings)	Midvale	73.49	41.85
UT/Tooele Army Depot (North Area)	Tooele	38.32	53.95
WI/Fort Howard Paper Co. Sludge Lagoons	Green Bay	30.83	(1)
WY/Mystery Bridge Rd/U.S. Highway 20	Evansville	45.22	32.10

(1) Score indeterminate but below 28.50.

Name Revisions

The names of [illegible] addressed in this final rule have been changed in response to information received during the comment period. The changes are intended to reflect more accurately the location, nature, or potential sources of contamination at the sites:

- Cheshire Ground Water Contamination (formerly Cheshire Associates Property), Cheshire, Connecticut
- North Market Street (formerly Tosco Corp. (Spokane Terminal)), Spokane, Washington

VI. Disposition of All Proposed Sites/Federal Facility Sites

To date, EPA has proposed 10 major updates to the NPL. This rule results in a total of 20 non-Federal sites that continue to be proposed pending completion of response to comment, resolution of technical issues, and resolution of various policy issues (Table 3). All sites that remain proposed will be considered for future final rules. Although these sites remain proposed, the comment periods have not been extended or reopened.

TABLE 3.—NPL PROPOSALS

Update #	Date/Federal Register citation	Number of sites/Federal facility sites	
		Proposed	Remaining proposed
1	9/8/83 48 FR 40674	132/1	1/0
2	10/15/84 49 FR 40320	208/38	11/0
3	4/10/85 50 FR 14115	26/6	0/0
4	9/18/85 50 FR 37950	38/3	0/0
5	6/10/86 51 FR 21099	43/2	2/0
6	1/22/87 52 FR 2492	63/1	1/0
7	6/24/88 53 FR 23988	215/14	4/0
8	5/5/89 54 FR 19526	10/0	0/0
9	7/14/89 54 FR 29820	0/52	0/0
10	10/26/89 54 FR 43776	23/2	1/0
ATSDR	8/16/89 54 FR 33846	2/0	0/0
Total		760/117	20/0

VII. Contents of the NPL

The 106 new sites added to the NPL in this rule (Table 1) have been incorporated into the NPL in order of their HRS scores (except where EPA modified the order to reflect top priorities designated by the States, as discussed in greater detail in previous rules, the most recent on March 31, 1989 (54 FR 13296).

The NPL appears at the end of this final rule and will be codified as part of appendix B to the NCP. Sites on the NPL are arranged according to their scores on the HRS. The NPL is presented in groups of 50 sites to emphasize that minor differences in HRS scores do not necessarily represent significantly different levels of risk. Except for the first group, the score range within the groups, as indicated in the list, is less than 4 points. EPA considers the sites within a group to have approximately the same priority for response actions. For convenience, the sites are numbered.

The following three sites previously were placed on the NPL because they met the requirements of the NCP at § 300.425(c)(3), as explained in section III of this rule:

- Forest Glen Mobile Home Subdivision, Niagara Falls, New York
- Radium Chemical Co., Inc., New York, New York
- Lansdowne Radiation Site, Lansdowne, Pennsylvania

These sites have HRS scores less than 28.50 and appear at the end of the list.

This rule adds 23 new sites to the Federal facility section of the NPL by group number.

VIII. Regulatory Impact Analysis

The costs of cleanup actions that may be taken at sites are not directly attributable to placement on the NPL, as explained below. Therefore, the Agency has determined that this rulemaking is not a "major" regulation under Executive Order 12291. EPA has conducted a preliminary analysis of economic implications of this amendment to the NCP. EPA believes that the kinds of economic effects associated with this revision generally are similar to those effects identified in the regulatory impact analysis (RIA) prepared in 1982 for the revisions to the NCP pursuant to section 105 of CERCLA and the economic analysis prepared when amendments to the NCP were proposed (50 FR 5882, February 12, 1985). The Agency believes the anticipated economic effects related to adding these 106 sites to the NPL can be characterized in terms of the conclusions of the earlier RIA and the most recent economic analysis. This rule was submitted to the Office of Management and Budget for review as required by Executive Order 12291.

Costs

EPA has determined that this rulemaking is not a "major" regulation under Executive Order 12291 because inclusion of a site on the NPL does not itself impose any costs. It does not establish that EPA necessarily will undertake remedial action, nor does it require any action by a private party or determine its liability for site response costs. Costs that arise out of site responses result from site-by-site decisions about what actions to take, not directly from the act of listing itself. Nonetheless, it is useful to consider the costs associated with responding to all sites included in this rulemaking.

The major events that follow the proposed listing of a site on the NPL are a search for potentially responsible parties and a remedial investigation/feasibility study (RI/FS) to determine if remedial actions will be undertaken at a site. Design and construction of the selected remedial alternative follow completion of the RI/FS, and operation and maintenance (O&M) activities may continue after construction has been completed.

EPA initially bears costs associated with responsible party searches. Responsible parties may bear some or all the costs of the RI/FS, remedial design and construction, and O&M, or EPA and the States may share costs.

The State cost share for site cleanup activities has been amended by section 104 of SARA. For privately-owned sites, as well as for publicly-owned but not publicly-operated sites, EPA will pay for 100% of the costs of the RI/FS and remedial planning, and 90% of the costs associated with remedial action. The State will be responsible for 10% of the remedial action. For publicly-operated sites, the State cost share is at least 50% of all response costs at the site, including the RI/FS and remedial design and construction of the remedial action selected. After the remedy is built, costs fall into two categories:

- For restoration of ground water and surface water, EPA will share in startup costs according to the criteria in the previous paragraph for 10 years or until a sufficient level of protectiveness is achieved before the end of 10 years.
- For other cleanups, EPA will share for up to 1 year the cost of that portion of response needed to assure that a remedy is operational and functional. After that, the State assumes full responsibilities for O&M.

In previous NPL rulemakings, the Agency estimated the costs associated with these activities (RI/FS), remedial design, remedial action, and O&M) on an average per site and total cost basis. EPA will continue with this approach, using the most recent (1988) cost estimates available; these estimates are presented below. However, there is wide variation in costs for individual sites, depending on the amount, type, and extent of contamination. Additionally, EPA is unable to predict what portions of the total costs responsible parties will bear, since the distribution of costs depends on the extent of voluntary and negotiated response and the success of any cost-recovery actions.

Cost category	Average total cost per site [1]
RI/FS	1,300,000
Remedial Design	1,500,000
Remedial Action	[2] 25,000,000
Net present value of O&M [3]	[2] 3,770,000

[1] 1988 U.S. Dollars.
[2] Includes State cost-share.
[3] Assumes cost of O&M over 30 years, $400,000 for the first year and 10% discount rate.

Source: Office of Program Management, Office of Emergency and Remedial Response, U.S. EPA.

Costs to States associated with today's final rule arise from the required State cost-share of: (1) 10% of remedial actions and 10% of first-year O&M costs at privately-owned sites and sites that are publicly-owned but not publicly-operated; and (2) at least 50% of the remedial planning (RI/FS and remedial design), remedial action, and first-year O&M costs at publicly-operated sites. States will assume the cost for O&M after EPA's period of participation. Using the assumptions developed in the 1982 RIA for the NCP, EPA has assumed that 90% of the 83 non-Federal sites added to the NPL in this rule will be privately-owned and 10% will be State- or locally-operated. Therefore, using the budget projections presented above, the cost to States of undertaking Federal remedial planning and actions, but excluding O&M costs, would be approximately $301.8 million. State O&M costs cannot be accurately determined because EPA, as noted above, will share O&M costs for up to 10 years for restoration of ground water and surface water, and it is not known how many sites will require this treatment and for how long. However, based on past experience, EPA believes a reasonable estimate is that it will share startup costs for up to 10 years at 25% of sites. Using this estimate, State O&M costs would be approximately $265.5 million.

Placing a hazardous waste site on the NPL does not itself cause firms responsible for the site to bear costs. Nonetheless, a listing may induce firms to clean up the sites voluntarily, or it may act as a potential trigger for subsequent enforcement or cost-recovery actions. Such actions may impose costs on firms, but the decisions to take actions are discretionary and made on a case-by-case basis. Consequently, precise estimates of these effects cannot be made. EPA does not believe that every site will be cleaned up by a responsible party. EPA cannot project at this time which firms or industry sectors will bear specific portions of the response costs, but the Agency considers: The volume and nature of the waste at the sites; the strength of the evidence linking the wastes at the site to the parties; the parties' ability to pay; and other factors when deciding whether and how to proceed against the parties.

Economy-wide effects of this amendment to the NCP are aggregations of effects on firms and State and local governments. Although effects could be felt by some individual firms and States, the total impact of this amendment on output, prices, and employment is expected to be negligible at the national level, as was the case in the 1982 RIA.

Benefits

The real benefits associated with today's amendment placing additional sites on the NPL are increased health and environmental protection as a result of increased public awareness of

potential hazards. In addition to the potential for more Federally-financed remedial actions, expansion of the NPL could accelerate privately-financed, voluntary cleanup efforts. Listing sites as national priority targets also may give States increased support for funding responses at particular sites.

As a result of the additional CERCLA remedies, there will be lower human exposure to high-risk chemicals, and higher-quality surface water, ground water, soil, and air. These benefits are expected to be significant, although difficult to estimate in advance of completing the RI/FS at these sites.

IX. Regulatory Flexibility Act Analysis

The Regulatory Flexibility Act of 1980 requires EPA to review the impacts of this action on small entities, or certify that the action will not have a significant impact on a substantial number of small entities. By small entities, the Act refers to small businesses, small government jurisdictions, and nonprofit organizations.

While modifications to the NPL are considered revisions to the NCP, they are not typical regulatory changes since the revisions do not automatically impose costs. The placing of sites on the NPL does not in itself require any action of any private party, nor does it determine the liability of any party for the cost of cleanup at the site. Further, no identifiable groups are affected as a whole. As a consequence, it is hard to predict impacts on any group. Placing a site on the NPL could increase the likelihood that adverse impacts to responsible parties (in the form of cleanup costs) will occur, but EPA cannot identify the potentially affected business at this time nor estimate the number of small businesses that might be affected.

The Agency does not expect that certain industries and firms within industries that have caused a proportionately high percentage of waste site problems could be significantly affected by CERCLA actions. However, EPA does not expect the impacts from the listing of these 83 non-Federal sites to have a significant economic impact on a substantial number of small businesses.

In any case, economic impacts would occur only through enforcement and cost-recovery actions, which are taken at EPA's discretion on a site-by-site basis. EPA considers many factors when determining what enforcement actions to take, including not only the firm's contribution to the problem, but also the firm's ability to pay.

The impacts (from cost recovery) on small governments and nonprofit organizations would be determined on a similar case-by-case basis.

List of Subjects in 40 CFR Part 300

Air pollution control, Chemicals, Hazardous materials, Intergovernmental relations, Natural resources, Oil pollution, Reporting and recordkeeping requirements, Superfund, Waste treatment and disposal, Water pollution control, Water supply.

Dated: August 22, 1990.

Mary Gade,

Acting Assistant Administrator, Office of Solid Waste and Emergency Response.

40 CFR part 300 is amended as follows:

PART 300—[AMENDED]

1. The authority citation for part 300 continues to read as follows:

Authority: 42 U.S.C. 9605; 42 U.S.C. 9620; 33 U.S.C. 1321(c)(2); E.O. 11735 (38 FR 21243); E.O. 12580 (52 FR 2923).

2. Appendix B of part 300 is revised to read as set forth below.

Appendix B—National Priorities List

NATIONAL PRIORITIES LIST (BY RANK)

[August 1990]

NPL rank	EPA reg.	St	Site name	City/ county
Group 1 (HRS Scores 71.60–58.54)				
1	02	NJ	Upper Landfill	Pittman.
2	03	DE	Tybouts Corner Landfill*	New Castle County.
3	03	PA	Bruin Lagoon	Bruin Borough.
4	02	NJ	Helen Kramer Landfill	Mantua Township.
5	01	MA	Industri-Plex	Woburn.
6	02	NJ	Price Landfill*	Pleasantville.
7	02	NY	Pollution Abatement Services*	Oswego.
8	07	IA	LaBounty Site	Charles City.
9	03	DE	Army Creek Landfill	New Castle County.
10	02	NJ	CPS/Madison Industries	Old Bridge Township.
11	01	MA	Nyanza Chemical Waste Dump	Ashland.
12	02	NJ	GEMS Landfill	Gloucester Township.
13	05	WI	Berlin & Farro	Swartz Creek.
14	04	MA	Baird & McGuire	Holbrook.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/ county
15	02	NJ	Lone Pine Landfill	Freehold Township.
16	01	NH	Somersworth Sanitary Landfill	Somersworth.
17	05	MN	FMC Corp. (Fridley Plant)	Fridley.
18	06	AR	Vertac, Inc	Jacksonville.
19	01	NH	Keefe Environmental Services	Epping.
20	08	MT	Silver Bow Creek/Butte Area	Silver Bow/ Deer Lodge.
21	08	SD	Whitewood Creek*	Whitewood.
22	06	TX	French, Ltd	Crosby.
23	05	MI	Liquid Disposal, Inc.	Utica.
24	01	NH	Sylvester*	Nashua.
25	03	PA	Tysons Dump	Upper Merion Twp.
26	03	PA	McAdoo Associates*	McAdoo Borough.
27	06	TX	Motco, Inc.*	La Marque.
28	05	OH	Arcanum Iron & Metal	Darke County.
29	08	MT	East Helena Site	East Helena.
30	06	TX	Sikes Disposal Pits	Crosby.
31	04	AL	Triana/ Tennessee River	Limestone/ Morgan.
32	09	CA	Stringfellow*	Glen Avon Heights.
33	01	ME	McKin Co	Gray.
34	06	TX	Crystal Chemical Co.	Houston.
35	02	NJ	Bridgeport Rental & Oil Services	Bridgeport.
36	08	CO	Sand Creek Industrial	Commerce City.
37	06	TX	Geneva Industries/ Fuhrmann Energy	Houston.
38	01	MA	W.R. Grace & Co Inc (Acton Plant)	Acton.
39	05	MN	New Brighton/ Arden Hills	New Brighton.
40	05	MN	Reilly Tar (St. Louis Park Plant)*	St. Louis Park.
41	02	NJ	Vineland Chemical Co., Inc.	Vineland.
42	02	NJ	Burnt Fly Bog	Marlboro Township.
43	04	FL	Bofors/Nobil Metals Corp.	Plant City.
44	03	PA	Publicker Industries Inc.	Philadelphia.
45	02	NY	Old Bethpage Landfill	Oyster Bay.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
46	04	FL	Reeves Southeast Galvanizing Corp.	Tampa.
47	02	NJ	Sheridalloy Corp	Newfield Borough.
48	08	MT	Anaconda Co. Smelter.	Anaconda.
49	10	WA	Western Processing Co., Inc.	Kent.
50	05	WI	Omega Hills North Landfill.	Germantown.
			Group 2 (HRS Scores 58.41–57.80, except for State top priority sites)	
51	04	FL	American Creosote (Pensacola Plt).	Pensacola.
52	02	NJ	Caldwell Trucking Co.	Fairfield.
53	02	NY	GE Moreau	South Glen Falls.
54	05	IN	Seymour Recycling Corp.*	Seymour.
55	04	FL	Peak Oil Co./ Bay Drum Co.	Tampa.
56	05	OH	United Scrap Lead Co., Inc.	Troy.
57	07	KS	Cherokee County	Cherokee County.
58	05	OK	Tar Creek (Ottawa County).	Ottawa County.
59	02	NJ	Brick Township Landfill.	Brick Township.
60	02	NJ	Brook Industrial Park.	Bound Brook.
61	05	MI	American Anodize, Inc.	Ionia.
62	10	WA	Frontier Hard Chrome, Inc.	Vancouver.
63	05	WI	Janesville Old Landfill.	Janesville.
64	05	MI	Northernaire Plating.	Cadillac.
65	04	SC	Independent Nail Co.	Beaufort.
66	05	WI	Janesville Ash Beds.	Janesville.
67	04	SC	Kalama Specialty Chemicals.	Beaufort.
68	07	IA	Lehigh Portland Cement Co.	Mason City.
69	04	FL	Davie Landfill	Davie.
70	05	OH	Miami County Incinerator.	Troy.
71	10	WA	ALCOA (Vancouver Smelter).	Vancouver.
72	10	ID	Eastern Michaud Flats Contamin.	Pocatello.
73	09	AZ	Tucson International Airport Area.	Tucson.
74	07	IA	Northwestern States Portland Cem.	Mason City.
75	05	WI	Wheeler Pit	La Prairie Township.
76	05	IN	International Minerals (E. Plant).	Terre Haute.
77	04	FL	Gold Coast Oil Corp.	Miami.
78	03	PA	Salford Quarry	Salford Township.
79	05	MI	Gratiot County Landfill*.	St. Louis.
80	01	RI	Picillo Farm*	Coventry.
81	01	MA	New Bedford Site*.	New Bedford.
82	06	LA	Old Inger Oil Refinery*.	Darrow.
83	05	OH	Chem-Dyne*	Hamilton.
84	04	SC	SCRDI Bluff Road*.	Columbia.
85	01	CT	Laurel Park, Inc.*	Naugatuck Borough.
86	08	CO	Marshall Landfill*	Boulder County.
87	05	IL	Outboard Marine Corp.*.	Waukegan.
88	06	NM	South Valley*	Albuquerque.
89	01	VT	Pine Street Canal*.	Burlington.
90	03	WV	West Virginia Ordnance*.	Point Pleasant.
91	07	MO	Ellisville Site*	Ellisville.
92	08	ND	Arsenic Trioxide Site*.	Southeastern ND.
93	07	IA	Aidex Corp.*	Council Bluffs.
94	05	WI	N.W. Mauthe Co., Inc.*.	Appleton.
95	04	TN	North Hollywood Dump*.	Memphis.
96	04	KY	A.L. Taylor (Valley of Drums)*.	Brooks.
97	09	GU	Ordot Landfill*	Guam.
98	04	MS	Flowood Site*	Flowood.
99	08	UT	Rose Park Sludge Pit*.	Salt Lake City.
100	07	KS	Arkansas City Dump*.	Arkansas City.
			Group 3 (HRS Scores 57.80–52.58)	
101	10	WA	General Electric (Spokane Shops).	Spokane.
102	09	CA	Operating Industries, Inc. Landfill.	Monterey Park.
103	02	NY	Wide Beach Development.	Brant.
104	09	CA	Iron Mountain Mine.	Redding.
105	02	NJ	Scientific Chemical Processing.	Carteret.
106	08	CO	California Gulch	Leadville.
107	02	NJ	D'Imperio Property.	Hamilton Township.
108	05	MN	Oakdale Dump	Oakdale.
109	05	IL	Parsons Casket Hardware Co.	Belvidere.
110	05	IL	A & F Material Reclaiming, Inc.	Greenup.
111	03	PA	Douglassville Disposal.	Douglassville.
112	05	MN	Koppers Coke	St. Paul.
113	01	MA	Plymouth Harbor/ Cannon Eng. Corp.	Plymouth.
114	10	ID	Monsanto Chemical (Soda Springs).	Soda Springs.
115	10	ID	Bunker Hill Mining & Metallurg.	Smelterville.
116	02	NY	Hudson River PCBs.	Hudson River.
117	02	NJ	Universal Oil Products (Chem Div).	East Rutherford.
118	09	CA	Aerojet General Corp.	Rancho Cordova.
119	10	WA	Com Bay, South Tacoma Channel.	Tacoma.
120	03	PA	Osborne Landfill	Grove City.
121	08	UT	Portland Cement (Kiln Dust 2 & 3).	Salt Lake City.
122	01	CT	Old Southington Landfill.	Southington.
123	02	NY	Syosset Landfill	Oyster Bay.
124	02	NY	Circuitron Corp	East Farmingdale.
125	09	AZ	Ninetyseventh Avenue Landfill.	Phoenix.
126	10	OR	Teledyne Wah Chang.	Albany.
127	10	WA	Midway Landfill	Kent.
128	02	NY	Sinclair Refinery	Wellsville.
129	04	AL	Mowbray Engineering Co.	Greenville.
130	05	MI	Spiegelberg Landfill.	Green Oak Township.
131	04	FL	Miami Drum Services.	Miami.
132	02	NJ	Reich Farms	Pleasant Plains.
133	10	ID	Union Pacific Railroad Co.,	Pocatello.
134	02	NJ	South Brunswick Landfill.	South Brunswick.
135	03	PA	Raymark	Hatboro.
136	04	AL	Ciba-Geigy Corp. (Mclntosh Plant).	McIntosh.
137	04	FL	Kassauf-Kimerling Battery.	Tampa.
138	05	IL	Waukonda Sand & Gravel.	Waukonda.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

(August 1990)

NPL rank	EPA reg.	St	Site name	City/county
139	05	MI	Bofors Nobel, Inc.	Muskegon.
140	06	TX	Bailey Waste Disposal.	Bridge City.
141	01	NH	Ottati & Goss/Kingston Steel Drum.	Kingston.
142	05	MI	Ott/Story/Cordova Chemical Co.	Dalton Township.
143	05	MI	Thermo-Chem, Inc.	Muskegon.
144	09	CA	Brown & Bryant, Inc. (Arvin Plant).	Arvin.
145	03	VA	Greenwood Chemical Co.	New-town.
146	02	NJ	ARI Industries	Pednick-town.
147	05	MN	St. Regis Paper Co.	Cass Lake.
148	04	KY	Brantley Landfill	Island.
149	04	NC	Aberdeen Pesticide Dumps.	Aber-deen.
150	01	VT	Burgess Brothers Landfill.	Wood-ford.

Group 4 (HRS Scores 53.53–50.23)

151	02	NJ	Ringwood Mines/Landfill.	Ring-wood Bor-ough.
152	04	FL	Whitehouse Oil Pits.	White-house.
153	04	GA	Hercules 009 Landfill.	Brunswick.
154	02	NY	Jones Sanitation	Hyde Park, Lyndon.
155	01	VT	Parker Sanitary Landfill.	
156	05	MI	Velsicol Chemical Corp. (Michigan).	St. Louis.
157	05	OH	Summit National	Deerfield Town-ship.
158	02	NY	Love Canal	Niagara Falls.
159	10	WA	Seattle Mun Landfill (Kent Highlands).	Kent.
160	03	DE	Coker's Sanitation Service Landfill.	Kent County.
161	05	MI	Rockwell International (Allegan).	Allegan.
162	05	MN	Pine Bend Sanitary Landfill.	Dakota County.
163	07	IA	Lawrence Todtz Farm.	Ca-menche.
164	05	IL	Beloit Corp.	Rockton.
165	05	IN	Fisher-Calo	LaPorte.
166	04	FL	Pioneer Sand Co.	Warring-ton.
167	05	MI	Springfield Township Dump.	Davis-burg.
168	03	PA	Hassick Landfill	Buffalo Town-ship.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

(August 1990)

NPL rank	EPA reg.	St	Site name	City/county
169	04	NC	Martin-Marietta, Sodyeco, Inc.	Char-lotte.
170	03	DE	E.I. Du Pont (Newport Plant Lf).	Newport.
171	03	PA	Heller-town Manufacturing Co..	Heller-town.
172	04	FL	Zellwood Ground Water Contamin.	Zell-wood.
173	05	MI	Packaging Corp. of America.	Filer City.
174	05	WI	Muskego Sanitary Landfill.	Mus-kego.
175	10	ID	Kerr-McGee Chemical (Soda Springs).	Soda Springs.
176	05	IN	Whiteford Sales & Bar/National Lease.	South Bend.
177	02	NY	Hooker (S Area)	Niagara Falls.
178	03	PA	Lindane Dump	Harrison Town-ship.
179	08	CO	General Cty-Clear Creek.	Idaho Springs.
180	02	NJ	Ventron/Velsicol	Wood Ridge Bor-ough.
181	04	FL	Taylor Road Landfill.	Sanford.
182	01	RI	Western Sand & Gravel.	Burril-ville.
183	02	NY	Nascip Brothers Scrap Yard/Dump.	Cortland.
184	04	SC	Koppers Co Inc (Florence Plant).	Florence.
185	02	NJ	Maywood Chemical Co	May-wood/Rochelle Pk.
186	02	NJ	Roscoitte Corp.	Millville.
187	05	OH	Industrial Excess Landfill.	Union-town.
188	09	CA	Industrial Waste Processing.	Fresno.
189	06	OK	Hardage/Criner	Criner.
190	05	MI	Ross Township Dump.	Ross Town-ship.
191	05	MN	Waste Disposal Engineering.	Andover.
192	02	NY	Liberty Industrial Finishing.	Farming-dale.
193	02	NJ	Kin-Buc Landfill	Edison Town-ship.
194	05	IN	Westie, Inc., Landfill.	Michigan City.
195	05	OH	Bowers Landfill	Circle-ville.
196	06	TX	Brio Refining, Inc.	Friends-wood.
197	02	NJ	Ciba-Geigy Corp.	Toms River.
198	05	MI	Bothenorth #2 Landfill.	Grand Rapids.
199	02	NJ	American Cyanamid Co.	Bound Brook.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

(August 1990)

NPL rank	EPA reg.	St	Site name	City/county
200	03	PA	Helena Landfill	North Whitehall Twp.

Group 5 (HRS Scores 50.19–47.49)

201	02	NJ	Evan Property	Shamong Township.
202	02	NY	Batavia Landfill	Batavia.
203	05	IL	Woodstock Municipal Landfill.	Wood-stock.
204	05	MN	Boles Cascade/Onan/Medtronics.	Fridley.
205	05	IL	MEG/Bervane Landfill.	Belvi-dere.
206	01	RI	Landfill & Resource Recovery.	North Smith-field.
207	06	MI	Hi-Mill Manufacturing Co.	Highland.
208	03	PA	Butler Mine Tunnel.	Pittston.
209	04	FL	Northwest 58th Street Landfill.	Hialeah.
210	02	NJ	Delilah Road	Egg Harbor Town-ship.
211	03	PA	Mill Creek Dump	Erie.
212	02	NJ	Glen Ridge Radium Site.	Glen Ridge.
213	02	NJ	Montclair/West Orange Radium Site.	Mont-clair/W Orange.
214	01	CT	Precision Plating Corp.	Vernon.
215	04	FL	Thirty-Second Street Dump.	Tampa.
216	05	MI	SBW Landfill	Utica.
217	01	VT	Bennington Municipal Sanitary Lf.	Bennington.
218	04	NC	Celanese (Shelby Fiber Operations).	Shelby.
219	02	NJ	Metaltec/Aerosystems.	Franklin Bor-ough.
220	05	WI	Schmalz Dump	Harrison.
221	04	TN	Carter Air Conditioning Co.	Collier-ville.
222	05	MI	Motor Wheel, Inc.	Lansing.
223	05	WI	Better Brite Chrome & Zinc Shops.	DePere.
224	09	CA	Southern Calif Edison (Visalia).	Visalia.
225	02	NJ	Lang Property	Pemberton Town-ship.
226	06	TX	Bruce, Inc.	Waskom.
227	02	NJ	Sharkey Landfill	Parsip-pany/Troy Hills.
228	09	CA	Selma Treating Co.	Selma.
229	06	LA	Cleve Reber	Bonne Ma.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
230	05	IL	Velsicol Chemical Corp. (Illinois).	Marshall.
231	07	MO	Wheeling Disposal Service Co. Lf.	Amazonia.
232	05	MI	Tar Lake	Manistique Township.
233	02	NY	Johnstown City Landfill.	Town of Johnstown.
234	04	NC	NC State U. Expt. Sta. Farm Unit #1).	Raleigh.
235	08	CO	Lowry Landfill	Arapahoe County.
236	05	MN	MacGillis & Gibbs/Bell Lumber	New Brighton.
237	03	PA	Hunterstown Road.	Straban Township.
238	03	MD	Woodlawn County Landfill.	Woodlawn.
239	05	WI	Hechimovich Sanitary Landfill.	Williamstown.
240	07	IA	Mid-America Tanning Co.	Sergeant Bluff.
241	07	NE	Lindsay Manufacturing Co.	Lindsay.
242	02	NJ	Combe Fill North Landfill.	Mount Olive Twp.
243	01	MA	Re-Solve, inc	Dartmouth.
244	02	NJ	Goose Farm	Plumstead Township.
245	04	TN	Velsicol Chem (Hardeman County).	Toone.
246	02	NY	York Oil Co	Moira.
247	04	FL	Sapp Battery Salvage.	Cottondale.
248	04	SC	Wamchem, Inc	Burton.
249	02	NJ	Chemical Leaman Tank Lines, Inc.	Bridgeport.
250	05	WI	Master Disposal Service Landfill.	Brookfield.

Group 6 (HRS Scores 47.80–46.01)

251	07	KS	Doepke Disposal (Hoffdale).	Johnson County.
252	02	NJ	Florence Land Reconstruction Landfill.	Florence Township.
253	01	RI	Davis Liquid Waste.	Smithfield.
254	01	MA	Charles-George Reclamation Landfill.	Tyngsborough.
255	02	NJ	King of Prussia	Winslow Township.
256	05	VA	Chisman Creek	York County.
257	05	OH	Nease Chemical	Salem.
258	08	CO	Eagle Mine	Minturn/Redcliff.
259	02	NJ	Chemical Control	Elizabeth.
260	04	NC	Charles Macon Lagoon & Drum Stor.	Cordova.
261	04	SC	Leonard Chemical Co., Inc.	Rock Hill.
262	05	OH	Allied Chemical & Ironton Coke.	Ironton.
263	05	MI	Verona Well Field.	Battle Creek.
264	07	MO	Lee Chemical	Liberty.
265	01	CT	Beacon Heights Landfill.	Beacon Falls.
266	04	AL	Stauffer Chem (Cold Creek Plant).	Bucks.
267	05	MN	Burlington Northern (Brainerd).	Brainerd/Baxter.
268	05	MI	Torch Lal	Houghton County.
269	01	RI	Central Landfill	Johnston.
270	03	PA	Malvern TCE	Malvern.
271	02	NY	Facet Enterprises, Inc.	Elmira.
272	03	DE	Delaware Sand & Gravel Landfill.	New Castle County.
273	03	PA	Tonolli Corp.	Nesquehoning.
274	04	NC	National Starch & Chemical Corp.	Salisbury.
275	03	PA	MW Manufacturing.	Valley Township.
276	03	VA	C & R Battery Co., Inc.	Chesterfield County.
277	04	TN	Murray-Ohio Dump.	Lawrenceburg.
278	05	IN	Environchem Corp.	Zionsville.
279	05	IN	MIDCO I	Gary.
280	05	OH	Onmet Corp.	Harrisburg.
281	05	OH	South Point Plant	South Point.
282	01	CT	Gallup's Quarry	Plainfield.
283	03	PA	Whitmoyer Laboratories.	Jackson Township.
284	07	IA	Peoples Natural Gas Co.	Dubuque.
285	07	MO	Oronogo-Duenweg Mining Belt.	Jasper County.
286	04	FL	Coleman-Evans Wood Preserving Co.	Whitehouse.
287	02	NJ	Dayco Corp./L.E. Carpenter Co.	Wharton Borough.
288	03	PA	Shriver's Corner	Strasburg Township.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
289	03	PA	Domay Road Landfill.	Upper Mecungie Twp.
290	03	PA	Berks Landfill	Spring Township.
291	05	IN	Northside Sanitary Landfill, Inc.	Zionsville.
292	05	IL	Interstate Pollution Control, Inc.	Rockford.
293	06	AR	Monroe Auto Equip (Paragould Plt).	Paragould.
294	06	OK	Oklahoma Refining Co	Cyril.
295	07	IA	E.I. Du Pont (County Rd X23).	West Point.
296	09	CA	Pacific Coast Pipe Lines.	Fillmore.
297	02	NJ	Global Sanitary Landfill.	Old Bridge Township.
298	04	FL	Florida Steel Corp.	Indiantown.
299	03	PA	Occidental Chem/Firestone Tire.	Lower Pottsgrove Twp.
300	03	VA	Culpeper Wood Preservers, Inc.	Culpeper.

Group 7 (HRS Scores 46.91–43.75)

301	05	IL	Pagel's Pit	Rockford.
302	05	MN	University Minn Rosemount Res Cen.	Rosemount.
303	05	MN	Freeway Sanitary Landfill.	Burnsville.
304	05	WI	Tomah Municipal Sanitary Landfill.	Tomah.
305	09	AZ	Litchfield Airport Area.	Goodyear/Avondale.
306	09	CA	Firestone Tire (Salinas Plant).	Salinas.
307	02	NJ	Spence Farm	Plumstead Township.
308	06	AR	Mid-South Wood Products.	Mena.
309	04	MS	Newsome Brothers/Old Reichhold.	Columbia.
310	09	CA	Atlas Asbestos Mine.	Fresno County.
311	09	CA	Coalinga Asbestos Mine.	Coalinga.
312	04	FL	Brown Wood Preserving.	Live Oak.
313	02	NY	Port Washington Landfill.	Port Washington.
314	05	IN	Columbus Old Municipal Landfill #1.	Columbus.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
315	02	NJ	Combe Fill South Landfill	Chester Township.
316	02	NJ	JIS Landfill	Jamesburg/S. Brunswick.
317	02	NY	Tronic Plating Co., Inc.	Farmingdale.
318	03	PA	Centre County Kepone	State College Boro.
319	04	FL	Agrico Chemical Co.	Pensacola.
320	05	OH	Fields Brook	Ashtabula.
321	01	CT	Solvents Recovery Service New Eng.	Southington.
322	06	CO	Woodbury Chemical Co.	Commerce City.
323	02	NJ	Welldick Aerospace Devices, Inc.	Wall Township.
324	01	MA	Hocomonco Pond	Westborough.
325	04	KY	Distler Brickyard	West Point.
326	02	NY	Ramapo Landfill	Ramapo.
327	09	CA	Coast Wood Preserving	Ukiah.
328	09	CA	South Bay Asbestos Area	Alviso.
329	02	NY	Mercury Refining, Inc.	Colonie.
330	04	FL	Hollingsworth Solderless Terminal	Fort Lauderdale.
331	02	NY	Olean Well Field	Olean.
332	04	AL	T.H. Agricul & Nutri (Montgomery)	Montgomery.
333	09	CA	Fairchild Semiconduct (S San Jose)	South San Jose.
334	10	WA	Pasco Sanitary Landfill	Pasco.
335	09	CA	Sulphur Bank Mercury Mine	Clear Lake.
336	05	MN	Joslyn Manufacturing & Supply Co.	Brooklyn Center.
337	03	PA	York County Solid Waste/Refuse Lf.	Hopewell Township.
338	05	WI	Spiegler Landfill	Spencer.
339	06	MN	Prewitt Abandoned Refinery	Prewitt.
340	08	CO	Denver Radium Site	Denver.
341	02	NY	Tri-Cities Barrel Co., Inc.	Port Crane.
342	03	PA	Route 940 Drum Dump	Pocono Summit.
343	04	FL	Tower Chemical Co.	Clermont.
344	05	MI	Peerless Plating Co.	Muskegon.
345	01	VT	Darling Hill Dump	Lyndon.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
346	03	PA	C & D Recycling	Foster Township.
347	04	KY	Fort Hartford Coal Co Stone Quarry	Olaton.
348	07	MO	Syntex Facility	Verona.
349	08	MT	Milltown Reservoir Sediments	Milltown.
350	05	MN	Arrowhead Refinery Co.	Hermantown.
Group 8 (HRS Scores 43.70–42.33)				
351	10	OR	Martin-Marietta Aluminum Co.	The Dalles.
352	08	CO	Uravan Uranium (Union Carbide)	Uravan.
353	02	NJ	Pijak Farm	Plumstead Township.
354	02	NJ	Syncon Resins	South Kearny.
355	05	MN	Oak Grove Sanitary Landfill	Oak Grove Township.
356	07	IA	White Farm Equipment Co. Dump	Charles City.
357	09	CA	Liquid Gold Oil Corp.	Richmond.
358	09	CA	Purity Oil Sales, Inc.	Malaga.
359	01	NH	Tinkham Garage	Londonderry.
360	04	FL	Alpha Chemical Corp.	Gallo-way.
361	02	NJ	Bog Creek Farm	Howell Township.
362	01	ME	Saco Tannery Waste Pits	Saco.
363	03	PA	River Road Ll/Waste	Harmi-age.
364	02	PR	[illegible] Inc.	Rio Abajo.
365	04	FL	Picker[illegible]wood Landfill	Jackson-ville.
366	05	OH	Alaco Anaconda	Gnaden-hutten.
367	01	MA	Iron Horse Park	Billerica.
368	03	PA	Palmerton Zinc Pits	Palmer-ton.
369	05	IN	Neal's Landfill (Bloomington)	Bloom-ington.
370	05	WI	Kohler Co. Landfill	Kohler.
371	04	AL	Interstate Lead Co. (ILCO)	Leeds.
372	04	FL	Standard Auto Bumper Corp.	Hialeah.
373	07	KS	Hydro-Flex Inc	Topeka.
374	09	AZ	Hassayampa Landfill	Has-sayampa.
375	06	LA	Gulf Coast Vacuum Services	Abbe-ville.
376	05	IL	Tri-County Ll/Waste Mgmt Illinois	South Elgin.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
377	01	MA	Silresim Chemical Corp.	Lowell.
378	01	MA	Wells G&H	Woburn.
379	01	CT	Nutmeg Valley Road	Wolcott.
380	02	NJ	Chemsol, Inc	Piscataway.
381	05	WI	Lauer I Sanitary Landfill	Menomonee Falls.
382	05	MI	Petoskey Municipal Well Field	Petoskey.
383	05	MN	Union Scrap Iron & Metal Co.	Minneapolis.
384	01	MA	Atlas Tack Corp	Fairhaven.
385	02	NJ	Radiation Technology, Inc.	Rockaway Township.
386	02	NJ	Fair Lawn Well Field	Fair Lawn.
387	05	IN	Main Street Well Field	Elkhart.
388	05	MN	Lehillier/Mankato Site	Lehillier/Mankato.
389	01	WA	Lakewood Site	Lakewood.
390	03	PA	Industrial Lane	Williams Township.
391	04	FL	Airco Plating Co	Miami.
392	05	IN	Fort Wayne Reduction Dump	Fort Wayne.
393	05	WI	Onalaska Municipal Landfill	Onalaska.
394	03	PA	A.I.W. Frank/Mid-County Mustang	Exton.
395	05	WI	National Presto Industries, Inc.	Eau Claire.
396	02	NJ	Monroe Township Landfill	Monroe Township.
397	03	PA	Commodore Semiconductor Group	Lower Providence Twp.
398	02	NJ	Rockaway Borough Well Field	Rockaway Township.
399	05	IL	Lenz Oil Service, Inc.	Lemont.
400	05	IN	Wayne Waste Oil	Columbia City.
Group 9 (HRS Scores 42.33–41.60)				
401	10	WA	Pacific Car & Foundry Co.	Renton.
402	07	IA	John Deere (Ottumwa Works Lndfls)	Ottumwa.
403	03	MD	Mid-Atlantic Wood Preservers, Inc.	Harmans.
404	03	PA	Novak Sanitary Landfill	South Whitehall Twp.
405	05	IN	Himco Dump	Elkhart.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
406	10	ID	Pacific Hide & Fur Recycling Co.	Pocatello.
407	07	IA	Des Moines TCE	Des Moines.
408	02	NJ	Beachwood/Berkley Wells	Berkley Township.
409	02	NJ	South Jersey Clothing Co.	Minotola.
410	02	NY	Vestal Water Supply Well 4-2	Vestal.
411	02	PR	Vega Alta Public Supply Wells	Vega Alta.
412	03	PA	Avco Lycoming (Williamsport Div.)	Williamsport.
413	03	PA	Ohio River Park	Neville Island.
414	04	GA	Wolfolk Chemical Works, Inc.	Fort Valley.
415	05	IL	Southeast Rockford Grnd Wtr Con.	Rockford.
416	05	IN	Tippecanoe Sanitary Landfill, Inc.	Lafayette.
417	05	IN	Conrail Rail Yard (Elkhart)	Elkhart.
418	05	IN	Galen Myers Dump/Drum Salvage	Osceola.
419	05	MI	Sturgis Municipal Wells	Sturgis.
420	05	MI	Barrels, Inc	Lansing.
421	05	MI	Sizzle Disposal Landfill, Inc.	Grand Rapids.
422	05	MN	Washington County Landfill	Lake Elmo
423	05	MN	Dakhue Sanitary Landfill	Cannon Falls.
424	06	TX	Odessa Chromium #1	Odessa.
425	06	TX	Odessa Chromium #2 (Andrews Highway)	Odessa.
426	07	IA	Electro-Coatings, Inc.	Cedar Rapids.
427	07	NE	Hastings Ground Water Contamin.	Hastings.
428	08	SD	Williams Pipe Line Disposal Pit	Sioux Falls.
429	09	AZ	Indian Bend Wash Area	Scottsdale/Tempe/Phnx.
430	09	CA	San Gabriel Valley (Area 1)	El Monte.
431	09	CA	San Gabriel Valley (Area 2)	Baldwin Park Area.
432	09	CA	San Fernando Valley (Area 1)	Los Angeles.
433	09	CA	San Fernando Valley (Area 2)	Los Angeles/Glendale.
434	09	CA	San Fernando Valley (Area 3)	Glendale.
435	09	CA	T.H. Agriculture & Nutrition Co.	Fresno.
436	10	AK	Arctic Surplus	Fairbanks.
437	10	WA	Cove Bay, Near Shore/Tide Flats	Pierce County.
438	05	IL	LaSalle Electric Utilities	LaSalle.
439	05	IL	Cross Brothers Pail (Pembroke)	Pembroke Township.
440	04	GA	Cedartown Industries, Inc.	Cedartown.
441	04	NC	Jadco-Hughes Facility	Belmont.
442	05	IN	Southside Sanitary Landfill	Indianapolis.
443	02	NJ	Monitor Devices/Intercircuits Inc.	Ariel township.
444	01	VT	BFI Sanitary Landfill (Rockingham)	Rockingham.
445	02	PR	Upjohn Facility	Barceloneta.
446	04	NC	Koppers Co Inc (Morrisville Plnt)	Morrisville.
447	08	UT	Sharon Steel (Midvale Tailings)	Midvale.
448	09	CA	McColl	Fullerton.
449	03	PA	Henderson Road	Upper Merion Twp.
450	02	NY	Hooker Chemical/Ruco Polymer Corp.	Hicksville.

Group 10 (NRS Docnos 41.58–35.39)

451	10	WA	Colbert Landfill	Colbert.
452	06	LA	Petro-Processors of Louisiana Inc.	Scotlandville.
453	03	PA	Westinghouse Elec (Sharon Plant)	Sharon.
454	02	NY	Applied Environmental Services	Glenwood Landing.
455	02	PR	Barceloneta Landfill	Florida Alivera.
456	01	NH	Tibbets Road	Barrington.
457	03	MD	Sand, Gravel & Stone	Elkton.
458	03	PA	Delta Quarries/Stoller Landfill	Antis/Logan Twps.
459	01	CT	Revere Textile Prints Corp.	Stamford.
460	05	MI	Spartan Chemical Co.	Wyoming.
461	02	NJ	Roebling Steel Co.	Florence.
462	03	PA	East Mount Zion	Springettsbury Twp.
463	04	GA	T.H. Agricul & Nutri (Albany)	Albany.
464	04	TN	Ammicola Dump	Chattanooga.
465	02	NJ	Vineland State School	Vineland.
466	09	AZ	Motorola, Inc. (52nd Street Plant)	Phoenix.
467	01	MA	Groveland Wells	Groveland.
468	02	NY	General Motors (Cent Foundry Div)	Massena.
469	01	NH	Mottolo Pig Farm	Raymond.
470	03	VA	Buckingham County Landfill	Buckingham.
471	04	SC	SCRDI Dixiana	Cayce.
472	05	MI	Roto-Finish Co., Inc.	Kalamazoo.
473	05	MN	Olmsted County Sanitary Landfill	Oronoco.
474	07	MO	Ouality Plating	Sikeston.
475	05	IN	Prestolite Battery Division	Vincennes.
476	07	MO	Fulbright Landfill	Springfield.
477	02	NJ	Williams Property	Swainton.
478	02	NJ	Renora, Inc	Edison Township.
479	04	NC	FCX, Inc. (Washington Plant)	Washington.
480	03	PA	Jacks Creek/Sitkin Smelting & Ref.	Maitland.
481	06	NM	Cleveland Mill	Silver City.
482	02	NJ	Danzer & Schafer X-Ray Co.	Bayville.
483	02	NJ	Hercules, Inc. (Gibbstown Plant)	Gibbstown.
484	05	IN	Ninth Avenue Dump	Gary.
485	03	MD	Bush Valley Landfill	Abingdon.
486	04	SC	Golden Strip Septic Tank Service	Simpsonville.
487	04	SC	Rock Hill Chemical Co.	Rock Hill.
488	06	TX	Texarkana Wood Preserving Co.	Texarkana.
489	06	AR	Gurley Pit	Edmondson.
490	04	FL	Petroleum Products Corp.	Pembroke Park.
491	01	RI	Peterson/Puritan, Inc.	Lincoln/Cumberland.
492	07	MO	Times Beach Site	Times Beach.
493	05	WI	Wash King Laundry	Pleasant Prairie Twp.
494	05	MN	Whittaker Corp	Minneapolis.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
495	05	WI	Algoma Municipal Landfill	Algoma.
496	05	MN	NL Industries/Taracorp/Golden	St. Louis Park.
497	09	CA	Westinghouse Elec (Sunnyvale Plt)	Sunnyvale.
498	01	CT	Kellogg-Deering Well Field	Norwalk.
499	03	PA	Boarhead Farms	Bridgeton Township.
500	01	MA	Cannon Engineering Corp. (CEC)	Bridgewater.
Group 11 (NPRS Scores 36.89–38.20)				
501	05	MI	H. Brown Co., Inc.	Grand Rapids.
502	02	NY	Hooker Chemical Co., Inc.	Marybrook.
503	02	NY	Niagara County Refuse	Wheatfield.
504	04	FL	Sherwood Medical Industries	Deland.
505	09	CA	Western Pacific Railroad Co.	Oroville.
506	04	AL	Olin Corp. (McIntosh Plant)	McIntosh.
507	05	MI	Southwest Ottawa County landfill	Park township.
508	02	NY	Kentucky Avenue Well Field	Horseheads.
509	02	NY	Peasley Solvents & Chemicals, Inc.	Hempstead.
510	06	TX	Sol Lynn/ Industrial Transformers	Houston.
511	02	NJ	Asbestos Dump	Millington.
512	04	KY	Lee's Lane Landfill	Louisville.
513	05	IL	Kem-McGee (Reed-Keppler Park)	West Chicago.
514	06	AR	Frit Industries	Walnut Ridge.
515	05	IL	Amoco Chemicals (Joliet Landfill)	Joliet.
516	04	FL	Woodbury Chemical (Princeton Plnt)	Princeton.
517	05	OH	Fultz Landfill	Jackson Township.
518	04	NC	New Hanover Cnty Airport Burn Pit	Wilmington.
519	10	OR	Allied Plating, Inc.	Portland.
520	05	OH	Coshocton Landfill	Franklin Township.
521	08	AZ	Apache Powder Co.	St. David.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
522	09	NV	Carson River Mercury Site	Lyon/ Churchill Cnty
523	03	PA	AMP, Inc. (Glen Rock Facility)	Glen Rock.
524	04	NC	JFD Electronics/ Channel Master	Oxford.
525	04	TN	Arlington Blending & Packaging	Arlington.
526	06	LA	PAB Oil & Chemical Service, Inc.	Abbeville.
527	04	FL	Sydney Mine Sludge Ponds	Brandon.
528	06	NM	Cimarron Mining Corp.	Carrizozo.
529	01	RI	Davis (GSR) Landfill	Glocester
530	03	PA	Lord-Shope Landfill	Girard township.
531	10	WA	FMC Corp. (Yakima Plt)	Yakima.
532	05	WI	Northern Engraving Co.	Sparta.
533	06	TX	South Cavalcade Street	Houston.
534	01	MA	PSC Resources	Palmer.
535	05	MI	Forest Waste Products	Otisville.
536	03	PA	Drake Chemical	Lock Haven.
537	09	CA	United Heckethorn Co.	Richmond.
538	01	NH	Kearsarge Metallurgical Corp.	Conway.
539	04	SC	Palmetto Wood Preserving	Dorena.
540	05	IL	Petersen Sand & Gravel	Libertyville.
541	05	MI	Clare Water Supply	Clare.
542	06	TX	Tex-Tin Corp.	Texas City
543	03	PA	Havertown PCP	Haverford.
544	03	DE	New Castle Spill	New Castle County.
545	07	MO	St Louis Airport/ Hlls/Fut Coatings	St. Louis County.
546	08	MT	Idaho Pole Co.	Bozeman.
547	03	DE	NCR Corp. (Millsboro Plant)	Millsboro.
548	05	IN	Lake Sandy Jo (M&M Landfill)	Gary.
549	05	IL	Johns-Manville Corp.	Waukegan.
550	05	MI	Chem Central	Wyoming Township.
Group 12 (NPRS Scores 36.29–37.82)				
551	05	MI	Novaco Industries	Temperance.
552	04	FL	Beulah Landfill	Pensacola.
553	05	MN	Windom Dump	Windom.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
554	05	IL	Kem-McGee (Residential Areas)	W Chic/ DuPage Cnty.
555	01	RI	Rose Hill Regional Landfill	South Kingstown.
556	02	NJ	Jackson Township Landfill	Jackson Township.
557	05	IL	NL Industries/ Taracorp Lead Smelt	Granite City.
558	04	KY	Red Penn Sanitation Co. Landfill	Pewee Valley.
559	05	MI	K&L Avenue Landfill	Oshtemo township.
560	05	OH	TRW Inc. (Minerva Plant)	Minerva.
561	10	WA	Kaiser Aluminum Mead Works	Mead.
562	06	OK	Mosley Road Sanitary Landfill	Oklahoma City.
563	01	CT	Barkhamsted-New Hartford Landfill	Barkhamsted.
564	07	IA	Fairfield Coal Gasification Plant	Fairfield.
565	05	MN	Perham Arsenic Site	Perham.
566	05	MI	Charlevoix Municipal Well	Charlevoix.
567	02	NJ	Montgomery Township Housing Devt.	Montgomery Township.
568	02	NJ	Rocky Hill Municipal Well	Rocky Hill Borough.
569	02	NJ	Cinnaminson Ground Water Contamin.	Cinnaminson Township.
570	02	NJ	Chemical Insecticide Corp.	Edison Township.
571	02	NY	Brewster Well Field	Putnam County.
572	02	NY	Vestal Water Supply Well 1-1	Vestal.
573	03	DE	Chem-Solv, Inc	Cheswold.
574	03	PA	Bally Ground Water Contamination	Bally Borough.
575	04	FL	Madison County Sanitary Landfill	Madison.
576	04	FL	Chemform, Inc	Pompano Beach.
577	04	FL	Wilson Concepts of Florida, Inc.	Pompano Beach.
578	04	NC	Bypass 601 Ground Water Contamin.	Concord.
579	04	NC	FCX, Inc. (Statesville Plant)	Statesville.
580	04	SC	Lexington County Landfill Area	Cayce.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
581	05	MI	Michigan Disposal (Cork Street Lf).	Kalamazoo.
582	07	MO	Solid State Circuits, Inc.	Republic.
583	07	NE	Waverly Ground Water Contamin.	Waverly.
584	08	CO	Chemical Sales CO.	Denver.
585	08	UT	Utah Power & Light/American Barrel.	Salt Lake City.
586	09	CA	Advanced Micro Devices, Inc.	Sunnyvale.
587	09	CA	Hexcel Corp	Livermore.
588	09	CA	Crazy Horse Sanitary Landfill.	Salinas.
589	10	OR	Union Pacific Railroad Tie Treat.	The Dalles.
590	10	WA	Hidden Valley Lndfl (Thun Field).	Pierce County.
591	10	WA	Yakima Plating Co.	Yakima.
592	05	MN	Nutting Truck & Caster Co.	Faribault.
593	02	NJ	U.S. Radium Corp.	Orange.
594	05	MI	Carter Industrials, Inc.	Detroit.
595	06	TX	Highlands Acid Pit.	Highlands.
596	03	PA	Resin Disposal	Jefferson Borough.
597	08	MT	Libby Ground Water Contamination.	Libby.
598	04	KY	Newport Dump	Newport.
599	04	SC	Sangamo/Twelve-Mile/Hartwell PCB.	Pickens.
600	03	PA	Moyers Landfill	Eagleville.

Group 13 (HRS Scores 37.53–36.79)

601	01	NH	Sewage Municipal Water Supply.	Milford.
602	05	MN	LaGrand Sanitary Landfill.	LaGrand Township.
603	05	IN	Poor Farm	Hancock County.
604	03	PA	Brown's Battery Breaking.	Shoemakersville.
605	02	NY	SMS Instruments, Inc.	Deer Park.
606	05	MI	Hedblum Industries.	Cascade.
607	06	TX	United Creosoting Co.	Conroe.
608	02	NY	Byron Barrel & Drum.	Byron.
609	05	MI	Bendix Corp./Allied Automotive.	St. Joseph.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
610	08	WY	Baxter/Union Pacific Tie Treating.	Laramie.
611	02	NY	Anchor Chemicals.	Hicksville.
612	05	MI	Waste Management—Mich (Holland).	Holland.
613	03	VA	Arrowhead Assoc./Scovill Corp.	Montross.
614	03	VA	Atlantic Wood Industries, Inc.	Portsmouth.
615	06	TX	North Cavalcade Street.	Houston.
616	02	NJ	Sayreville Landfill	Sayreville.
617	01	NH	Dover Municipal Landfill.	Dover.
618	02	NY	Ludlow Sand & Gravel.	Claverville.
619	03	VA	Saunders Supply Co.	Chuckatuck.
620	05	WI	City Disposal Corp. Landfill.	Dunn.
621	02	NJ	Tabernacle Drum Dump.	Tabernacle Township.
622	07	MO	Minker/Stout/Romaine Creek.	Imperial.
623	04	KY	Howe Valley Landfill.	Howe Valley.
624	01	CT	Yaworski Waste Lagoon.	Canterbury.
625	03	WV	Leetown Pesticide.	Leetown.
626	04	SC	Rochester Property.	Travisers Rest.
627	04	FL	Cabot/Koppers	Gainesville.
628	02	NJ	Evor Phillips Leasing.	Old Bridge Township.
629	03	PA	Williams Dick Lagoons.	West Cain Township.
630	05	IN	Douglass Road/Uniroyal, Inc., Lf.	Mishawaka.
631	03	PA	Lackawanna Refuse.	Old Forge Borough.
632	06	OK	Compass Industries (Avery Drive).	Tulsa.
633	02	NJ	Mannheim Avenue Dump.	Galloway Township.
634	05	IN	Neal's Dump (Spencer).	Spencer.
635	03	VA	Abex Corp.	Portsmouth.
636	02	NY	Fulton Terminals	Fulton.
637	05	MI	Allied Paper/Portage Ck/Kalamazoo, R.	Kalamazoo.
638	06	LA	Dutchtown Treatment Plant.	Ascension Parish.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
639	03	PA	Westinghouse Elevator Co. Plant.	Gettysburg.
640	10	WA	Centralia Municipal Landfill.	Centralia.
641	01	NH	Auburn Road Landfill.	Londonderry.
642	03	WV	Flex Chemical, Inc..	Nitro.
643	05	MN	General Mills/Henkel Corp..	Minneapolis.
644	04	TN	Wrigley Charcoal Plant.	Wrigley.
645	05	OH	Lasalle/Poplar Oil Co..	Jefferson Township.
646	05	OH	Old Mill	Rock Creek.
647	04	SC	Townsend Saw Chain Co..	Pontiac.
648	07	KS	Johns Taudge Pond	Wichita.
649	05	WI	Stoughton City Landfill.	Stoughton.
650	09	CA	Old Navy Petroleum Storage.	Crescent City.

Group 14 (HRS Scores 36.79–36.35)

651	03	VA	Suffolk City Landfill.	Suffolk.
652	01	VT	Tansitor Electronics, Inc.	Bennington.
653	02	NJ	Du Pont Chemical Co..	Kingwood Township.
654	03	PA	Middletown Air Fleld.	Middletown.
655	02	NJ	Swope Oil & Chemical Co.	Pennsauken.
656	04	GA	Monsanto Corp. (Augusta Plant).	Augusta.
657	01	NH	South Municipal Water Supply Well.	Peterborough.
658	01	ME	Winthrop Landfill	Winthrop.
659	03	WV	Ordnance Works (Disposal Areas.	Morgantown.
660	04	GA	Diamond Shamrock Corp. Landfill.	Cedartown.
661	05	OH	Zanesville Well Fields.	Zanesville.
662	01	CT	Cheshire Ground Water Contamin.	Cheshire.
663	02	NY	Sullivan Village Well Fields.	Village of Sullivan.
664	02	NY	Endicott Village Well Fields.	Village of Endicott.
665	03	DE	Dover Gas Light Co.	Dover.
666	00	PA	Abraham Plating	Scott Township.
667	00	PA	North Penn—Area 1.	Souderton.
668	03	PA	North Penn—Area 7.	North Wales.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
669	03	PA	North Penn—Area 9.	Lansdale.
670	03	PA	North Penn—Area 2.	Hatfield.
671	03	PA	North Penn—Area 5.	Montgomery Township.
672	04	FL	Helena Corp. (Palm Bay Plant).	Palm Bay.
673	05	IL	DuPage City Ldfl/ Blackwell Forest.	Warrenville.
674	05	MN	Kummer Sanitary Landfill.	Bismarck.
675	05	OH	Sanitary Landfill Co. (SWD).	Dayton.
676	05	WI	Eau Claire Municipal Well Field.	Eau Claire.
677	06	NM	Pagano Salvage	Los Lunas.
678	07	MO	Valley Park TCE	Valley Park.
679	09	CA	San Fernando Valley (Area 4).	Los Angeles.
680	09	CA	Monolithic Memories.	Sunnyvale.
681	09	CA	National Semiconductor Corp.,	Santa Clara.
682	09	CA	Fresno Municipal Sanitary Lndfll.	Fresno.
683	09	CA	Newmark Ground Water Contamin.	San Bernardino.
684	04	GA	Powersville Site	Peach County.
685	05	MI	Grand Traverse Overall Supply Co.,	Griffickville.
686	05	MI	Metamora Landfill.	Metamora.
687	02	NY	Niagara Mohawk Power (Saratoga Sts.	Saratoga Springs.
688	05	MI	Whitehall Municipal Wells.	Whitehall.
689	03	DE	Standard Chlorine of Delaware, Inc.	Delaware City.
690	05	MN	South Andover Site.	Andover.
691	02	NJ	Diamond Alkali Co.	Newark.
692	05	IN	Carter Lee Lumber Co.,	Indianapolis.
693	01	NH	Fletcher's Paint Works & Storage.	Milford.
694	03	VA	Avtex Fibers, Inc.	Front Royal.
695	05	MI	Kentwood Landfill.	Kentwood.
696	05	MI	Electrovoice	Buchanan.
697	09	CA	Jasco Chemical Corp.,	Mountain View.
698	02	NY	Katonah Municipal Well.	Town of Bedford.
699	04	FL	B&B Chemical Co., Inc.	Hialeah.
700	07	KS	29th & Mead Ground Water Contamin.	Wichita.
701	09	CA	Teledyne Semiconductor.	Mountain View.
702	02	PR	Fibers Public Supply Wells.	Jobos.
703	04	FL	B&B-Tedron	Lake Park.
704	03	VA	Dixie Caverns County Landfill.	Salem.
705	05	IN	Marion (Bragg) Dump.	Marion.
706	05	OH	Pristine, Inc.	Reading.
707	05	WI	Mid-State Disposal, Inc. Landfill.	Cleveland Township.
708	04	TN	American Creosote (Jackson Plant).	Jackson.
709	05	IL	Kerr-McGee (Sewage Treat Plant).	West Chicago.
710	08	CO	Broderick Wood Products.	Denver.
711	02	NY	C & J Disposal Leasing Co. Dump.	Hamilton.
712	05	OH	Buckeye Reclamation.	St. Clairsville.
713	02	NY	Pralgorried Plating Corp.	Farmingdale.
714	06	TX	Bio-Ecology Systems, Inc.	Grand Prairie.
715	08	UT	Monticello Rad Contaminated Props.	Monticello.
716	02	NJ	Woodland Route 532 Dump.	Woodland Township.
717	05	IN	American Chemical Service, Inc.	Griffith.
718	01	MA	Sikes Acres	Salem.
719	02	NY	Richardson Hill Road Ldfl/ Pond.	Sidney Center.
720	01	VT	Old Springfield Landfill.	Springfield.
721	03	PA	Bell Landfill	Terry Township.
722	02	NY	Solvent Savers	Lincklaen.
723	03	VA	U.S. Titanium	Piney River.
724	05	IL	Galesburg/ Koppers Co.	Galesburg.
725	09	CA	J.H. Baxter & Co	Weed.
726	02	NY	Hooker (Hyde Park).	Niagara Falls.
727	05	MI	SCA Independent Landfill.	Muskegon Heights.
728	02	NY	Action Anodizing, Plating Polish.	Copiague.
729	09	CA	MGM Brakes	Cloverdale.
730	06	LA	Bayou Sorrel Site.	Bayou Sorrel.
731	05	IL	H.O.D. Landfill	Antioch.
732	05	MI	Duel & Gardner Landfill.	Dalton Township.
733	10	WA	Mica Landfill	Mica.
734	02	NJ	Ellis Property	Evesham Township.
735	04	KY	DisSer Farm	Jefferson County.
736	09	CA	Waste Disposal, Inc.	Santa Fe Springs.
737	10	WA	Harbor Island (Lead).	Seattle.
738	05	WI	Lemberger Transport & Recycling.	Franklin Township.
739	05	OH	Z.H. Sohlfing Landfill.	Hamilton Township.
740	05	MI	CBIL/Dow Dump	Marquette.
741	02	NY	Clothier Disposal	Town of Granby.
742	03	PA	Amber Asbestos Piles.	Ambler.
743	10	WA	Queen City Farms.	Maple Valley.
744	02	NJ	Curcio Scrap Metal, Inc.	Saddle Brook Twp.
745	03	VA	L.A. Clarke & Son.	Spotsylvania County.
746	05	WI	Scrap Processing Co., Inc.	Medford.
747	03	MD	Southern Maryland Wood Treating.	Hollywood.
748	04	KY	Caldwell Lace Leather Co., Inc.	Auburn.
749	05	IL	Reds Energy Co	East Cape Girardeau
750	05	IL	Adams County Quincy Landfills 2&3.	Quincy.

Group 16 (HRS Scores 54.21–33.73)

751	05	MI	Keydon Corp.	Muskegon.
752	05	WI	Bask County Landfill.	Excelsior.
753	06	NM	Homestake Mining Co.	Milan.
754	06	TX	Dixie Oil Processors, Inc.	Friendswood.
755	09	CA	Beckman Instruments (Porterville).	Porterville.
756	05	MI	Muskegon Chemical Co.	Whitehall.
757	04	FL	Dubose Oil Products Co.	Cantonment.
758	05	MI	Mason County Landfill.	Pere Marquette Twp.
759	05	MI	Gossetary Dump	Rose Center.
760	07	IA	Red Oak City Landfill.	Red Oak.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
761	05	IN	Lakeland Disposal Service, Inc.	Cleypool.
762	02	NJ	Hopkins Farm	Plumstead Township.
763	04	NC	Cape Fear Wood Preserving.	Fayetteville.
764	01	RI	Stamina Mills, Inc.	North Smithfield.
35	05	WI	Lemberger Landfill, Inc.	Whitelaw.
766	05	IN	Reilly Tar (Indianapolis Plant).	Indianapolis.
767	01	ME	Pinette's Salvage Yard.	Washburn.
768	01	CT	Durham Meadows.	Durham.
769	03	DE	Tybar Refrigeration Pit.	Smyrna.
770	05	MI	Kysor Industrial Corp.	Cadillac.
771	09	CA	Lorentz Barrel & Drug Co.	San Jose.
772	02	NJ	Wilson Farm	Plumstead township.
773	02	NY	Conklin Dumps	Conklin.
774	03	PA	Old City of York Landfill.	Seven Valleys.
775	03	PA	Modern Sanitation Landfill.	Lower Windsor Twp.
776	05	IL	Byron Salvage Yard.	Byron.
777	05	MI	North Bronson Industrial Area.	Bronson.
778	03	PA	Stanley Kessler	King of Prussia.
779	04	SC	Helena Chemical Co. Landfill.	Fairfax.
780	07	MO	Kem-Peat Laboratories.	Cape Girardeau.
781	02	NJ	Imperial Oil/ Champion Chemicals.	Morganville.
782	02	NJ	Cosden Chemical Coatings Corp.	Beverly.
783	05	MN	St. Augusta Sanitation/Engan Dump.	St. Augusta Township.
784	02	NJ	Myers Property	Franklin Township.
785	02	NJ	Pepe Field	Boonton.
786	04	KY	Tri-City Disposal Co.	Shepherdsville.
787	10	WA	Northwest Transformer.	Everson.
788	02	NY	Genzale Plating Co.	Franklin Square.
789	05	MI	Albion-Sheridan Township Landfill.	Albion.
790	05	WI	Sheboygan Harbor & River.	Sheboygan.
791	06	LA	Combustion, Inc.	Denham Springs.
792	05	MI	Ossineke Ground Water Contamin.	Ossineke.
793	03	WV	Follansbee Site	Follansbee.
794	03	PA	Keystone Sanitation Landfill.	Union Township.
795	04	NC	Caroline Transformer Co.	Fayetteville.
796	02	NY	Carroll & Dubies Sewage Disposal.	Port Jervis.
797	02	NY	North Sea Municipal Landfill.	North Sea.
798	03	PA	Bendix Flight Systems Division.	Bridgewater Township.
799	07	IA	Farmers' Mutual Cooperative.	Hospers.
800	09	CA	Koppers Co. Inc. (Oroville Plant).	Oroville.
Group 17 (1988 Scores 33.73–32.87)				
801	09	CA	Louisiana-Pacific Corp.	Oroville.
802	01	CT	Unimaster Switch Corp.	Woodstock.
803	03	VA	H & H Inc., Burn Pit.	Farrington.
804	05	MI	South Macomb Disposal (Lf & SA).	Macomb Township.
805	05	MI	U.S. Aviex	Howard Township.
806	07	IA	Shaffer-Globe Corp. Disposal.	Keokuk.
807	03	PA	Walsh Landfill	Honeybrook Township.
808	02	NJ	Landfill & Development Co.	Mount Holly.
809	02	NJ	Upper Deerfield Township San Lndfl.	Upper Deerfield Twp.
810	02	NY	Hertel Landfill	Plattsbill.
811	02	NY	Hertland Complex.	Town of Hyde Park.
812	02	NY	Malta Rocket Fuel Area.	Malta.
813	02	NY	Jones Chemicals, Inc.	Caledonia.
814	03	DE	Kent County Landfill (Houston).	Houston.
815	03	PA	Saegertown Industrial Area.	Saegertown.
816	04	GA	Cedartown Municipal Landfill.	Cedartown.
817	06	MI	Kent City Mobile Home Park.	Kent City.
818	05	MN	Adrian Municipal Well Field.	Adrian.
819	06	NM	AT & SF (Clovis)	Clovis.
820	07	KS	Strother Field Industrial Park.	Cowley County.
821	07	KS	Obee Road	Hutchinson.
822	09	CA	CTS Printex, Inc.	Mountain View.
823	02	NJ	Fried Industries	East Brunswick Twp.
824	02	NY	American Thermostat Co.	South Cairo.
825	08	ND	Minot Landfill	Minot.
826	03	DE	Koppers Co., Inc. (Newport Plant).	Newport.
827	04	TN	Lewisburg Dump	Lewisburg.
828	05	MI	McGraw Edison Corp.	Albion.
829	02	NJ	Lodi Municipal Well.	Lodi.
830	02	NY	Goldisc Recordings, Inc.	Holbrook.
831	02	NY	Islip Municipal Sanitary Landfill.	Islip.
832	09	CA	Sola Optical USA, Inc.	Petaluma.
833	04	KY	Airco	Calvert City.
834	03	PA	Metal Banks	Philadelphia.
835	05	IL	Yeoman Creek Landfill.	Waukegan.
836	02	NY	Sarney Farm	Amenia.
837	05	MI	Folkertsma Refuse.	Grand Rapids.
838	03	DE	Seaford Limited	Mount Pleasant.
839	01	MA	Rose Disposal Pit.	Lanesboro.
840	05	OH	Van Dale Junkyard.	Marietta.
841		MT	Montana Pole and Treating.	Butte.
842	04	NC	Geigy Chemical Corp(Aberdeen Plt).	Aberdeen.
843	04	KY	B.F. Goodrich	Calvert City.
844	04	KY	General Tire/ Rubber(Mayfield Lndfl).	Mayfield.
845	04	SC	Para-Chem Southern, Inc.	Simpsonville.
846	05	MI	Organic Chemicals, Inc.	Grandville.
847	02	NY	BioClinical Laboratories, Inc.	Bohemia.
848	02	NY	Volney Municipal Landfill.	Town of Volney.
849	02	NY	PMC Corp. (Dublin Road Landfill).	Town of Shelby.
850	05	WI	Tomah Fairgrounds.	Tomah.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
Group 18 (HRS Scores 38.77–31.84)				
851	01	MA	Sullivan's Ledge	New Bedford.
852	04	KY	Smith's Farm	Brooks.
853	05	WI	Madison Metro Sewer District Leg.	Blooming Grove.
854	10	WA	North Market Street.	Spokane.
855	10	OR	Joseph Forest Products.	Joseph.
856	02	PR	Juncos Landfill	Juncos.
857	07	KS	Big River Sand Co.	Wichita.
858	05	IN	Bennett Stone Quarry	Bloomington.
859	10	WA	Wyckoff Co./ Eagle Harbor.	Bainbridge Island.
860	04	SC	Beaunit Corp/Circular Knit & Dye).	Fountain Inn.
861	02	NJ	Industrial Latex Corp.	Wallington Borough.
862	04	FL	Munisport Landfill.	North Miami.
863	06	LA	D.L. Mud, Inc.	Abbeville.
864	04	AL	Stauffer Chem (LeMoyne Plant).	Axis.
865	02	NJ	M&T Delisa Landfill.	Asbury Park.
866	06	TX	Crystal City Airport.	Crystal City.
867	04	SC	Geiger (C & M Oil).	Ravenloules.
868	03	PA	Paoli Rail Yard	Paoli.
869	05	WI	Mosa-American(Kerr-McGee Oil Co.).	Milwaukee.
870	05	WI	Waste Research & Reclamation Co.	Eau Claire.
871	10	OR	Gould, Inc.	Portland.
872	01	ME	Union Chemical Co., Inc.	South Hope.
873	02	NY	Cortese Landfill	Vil of Narrowsburg.
874	08	WY	Mystery Bridge Rd/U.S. Highway 20.	Evansville.
875	09	CA	Montrose Chemical Corp.	Torrance.
876	05	MN	St. Louis River Site.	St. Louis County.
877	05	MI	Auto Ion Chemicals, Inc.	Kalamazoo.
878	03	PA	Raritan/ Allied Steel Corp.	East Coventry Twp
879	05	WI	Hagen Farm	Stoughton.
880	04	SC	Carolawn, Inc.	Fort Lawn.
881	07	IA	Midwest Manufacturing/ North Farm.	Kellogg.
882	03	PA	Berks Sand Pit	Longswamp Township.
883	09	CA	Valley Wood Preserving, Inc.	Turlock.
884	03	PA	Butz Landfill	Stroudsburg.
885	04	FL	City Industries, Inc.	Orlando.
886	05	MI	Sparta Landfill	Sparta Township.
887	05	IL	Acme Solvent (Morristown Plant).	Morristown.
888	01	NH	Hatton Circle Ground Water Contam.	Londonderry.
889	02	NJ	Pomona Oaks Residential Wells.	Galloway Township.
890	02	NY	Rowe Industries Ground Water Cont.	Noyack/ Sag Harbor.
891	03	PA	Hebelka Auto Salvage Yard.	Weisenberg Township.
892	04	FL	Hippo Road Landfill.	Duval County.
893	05	MN	Long Prairie Ground Water Contam.	Long Prairie.
894	05	MN	Waite Park Wells	Waite Park.
895	07	NE	Nebraska Ordnance Plant (Former).	Mead.
896	09	CA	Applied Materials	Santa Clara.
897	09	CA	Intel Magnetics	Santa Clara.
898	09	CA	Intel Corp. (Santa Clara #6).	Santa Clara.
899	09	CA	TRW Microwave, Inc (Building 825.	Sunnyvale.
900	09	CA	Synertek, Inc. (Building 1).	Santa Clara.
Group 19 (HRS Scores 31.84–30.83)				
901	09	CA	Advanced Micro Devices (Bldg. 915).	Sunnyvale.
902	04	FL	Pepper Steel & Alloys, Inc.	Medley.
903	02	NY	Mattiace Petrochemical Co., Inc.	Glen Cove.
904	01	ME	O'Connor Co.	Augusta.
905	05	WI	Ocanomowoc Electroplating Co., Inc.	Ashippin.
906	05	IN	Continental Steel Corp	Kokomo.
907	05	MI	Rasmussen's Dump.	Green Oak Township.
908	02	NY	Kenmark Textile Corp.	Farmingdale.
909	04	FL	Wingate Road Munic Incinerat Dump	Fort Lauderdale.
910	03	PA	Westline Site	Westline.
911	04	KY	Maxey Flats Nuclear Disposal.	Hillsboro.
912	04	NC	Banfield Industries, Inc.	Hazelwood.
913	08	MT	Mouat Industries	Columbus.
914	05	MI	J&L Landfill	Rochester Hills.
915	02	NY	Claremont Polychemical.	Old Bethpage.
916	05	OH	Powell Road Landfill.	Dayton.
917	03	PA	Croydon TCE	Croydon.
918	04	SC	Medley Farm Drum Dump.	Gaffney.
919	04	SC	Elmore Waste Disposal.	Greer.
920	07	IA	Vogel Paint & Wax Co.	Orange City.
921	05	MN	Kurt Manufacturing Co.	Fridley.
922	05	OH	Reilly Tar & Chemical (Dover Plnt).	Dover.
923	05	MI	Parsons Chemical Works, Inc.	Grand Ledge.
924	03	PA	Revere Chemical Co.	Nockamixon Township.
925	05	MI	Ionia City Landfill	Ionia.
926	06	TX	Koppers Co., Inc. (Texarkana Plant)	Texarkana.
927	08	CO	Lincoln Park	Canon City.
928	08	CO	Smuggler Mountain	Pitkin County.
929	05	IN	Wadzeb Enterprises, Inc.	Lebanon.
930	02	PR	GE Wiring Devices.	Juana Diaz.
931	07	MO	Missouri Electric Works.	Cape Girardeau.
932	05	MI	Avenue "E" Ground Water Contamin.	Traverse City.
933	05	OH	New Lyme Landfill.	New Lyme.
934	02	NJ	Woodland Route 72 Dump.	Woodland Township.
935	02	PR	RCA Del Caribe	Barceloneta.
936	05	MN	Koch Refining Co./N-Ren Corp.	Pine Bend.
937	04	FL	Piper Aircraft/ Vero Beach Wtr&Swr.	Vero Beach.
938	03	PA	Brodhead Creek	Stroudsburg.
939	05	WI	Fadrowski Drum Disposal.	Franklin.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
940	10	OR	United Chrome Products, Inc.	Corvallis.
941	04	FL	Anodyne, Inc.	North Miami Beach.
942	04	FL	Anaconda Aluminum/Miller Electron.	Miami.
943	03	PA	Eastern Diversified Metals.	Hometown.
944	04	MI	Anderson Development Co.	Adrian.
945	05	WI	Hunts Disposal Landfill.	Caledonia.
946	05	MI	Shiawassee River.	Howell.
947	06	OK	Tenth Street Dump/Junkyard.	Oklahoma City.
948	10	AK	Alaska Battery Enterprises.	Fairbanks N Star Bor.
949	03	PA	Taylor Borough Dump.	Taylor Borough.
950	04	TN	Murray-Ohio Mfg (Horseshoe Bend).	Lawrenceburg.

Group 20 (HRS Scores 30.90–28.88)

951	03	DE	Halby Chemical Co.	New Castle.
952	02	NJ	Higgins Disposal	Kingston.
953	04	AL	Reduking Cement, Inc. (Saraland).	Saraland.
954	06	OK	Double Eagle Refinery Co.	Oklahoma City.
955	04	GA	Mathis Bros Lf (S Marble Top Rd).	Kensington.
956	03	DE	Harvey & Knott Drum, Inc.	Kirkwood.
957	04	TN	Gallaway Pits	Gallaway.
958	05	OH	Big D Campground.	Kingsville.
959	06	AR	Midland Products	Ola/Birta.
960	02	NY	Robintech, Inc./National Pipe Co.	Town of Vestal.
961	02	NY	BEC Trucking	Town of Vestal.
962	03	PA	Strasburg Landfill	Newlin Township.
963	06	OK	Fourth Street Abandoned Refinery.	Oklahoma City.
964	02	NJ	Wilco Chemical Corp. (Oakland Plt).	Oakland.
965	05	WI	Tomah Armory	Tomah.
966	03	DE	Wildcat Landfill	Dover.
967	05	MI	Burrows Sanitation.	Hartford.
968	05	PA	Blosenski Landfill	West Cain Township.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
969	03	VA	Rhinehart Tire Fire Dump.	Frederick County.
970	10	WA	Northwest Transformer (S Harkness).	Everson.
971	03	DE	Delaware City PVC Plant.	Delaware City.
972	03	MD	Limestone Road	Cumberland.
973	02	NY	Hooker (102nd Street).	Niagara Falls.
974	02	NJ	Higgins Farm	Franklin Township.
975	10	WA	American Crossarm & Conduit Co.	Chehalis.
976	06	NM	United Nuclear Corp.	Church Rock.
977	03	VA	Rentokil, Inc. (VA Wood Prsv Div).	Richmond.
978	06	AR	Industrial Waste Control.	Fort Smith.
979	09	CA	Celtor Chemical Works.	Hoopa.
980	01	MA	Haverhill Municipal Landfill.	Haverhill.
981	04	AL	Perdido Ground Water Contamin.	Perdido.
982	02	NY	Marathon Battery Corp.	Cold Springs.
983	02	NY	Colesville Municipal Landfill.	Town of Colesville.
984	04	FL	Yellow Water Road Dump.	Baldwin.
985	04	GA	Marzone Inc./Chevron Chemical Co.	Tifton.
986	05	OH	Stannar Landfill	West Chester.
987	03	VA	First Piedmont Quarry (Route 719).	Pittsylvania County.
988	04	NC	Chemtronics, Inc.	Swannanoa.
989	05	IN	MIDCO II	Gary.
990	05	MI	Cannelton Industries, Inc.	Sault Sainte Marie.
991	06	TX	Sheridan Disposal Services.	Hempstead.
992	07	KS	Pester Refinery Co.	El Dorado.
993	03	MD	Kane & Lombard Street Drums.	Baltimore.
994	07	MO	Shenandoah Stables.	Moscow Mills.
995	04	GA	Firestone Tire (Albany Plant).	Albany.
996	07	IA	Sheller Avenue Dump.	Charles City.
997	03	PA	Berkley Products Co. Dump.	Denver.
998	10	WA	Silver Mountain Mine.	Loomis.
999	06	TX	Petro-Chemical (Turtle Bayou).	Liberty County.
1000	04	MS	Howe-Duby Electric Co.	Goldsboro.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
Group 21 (HRS Scores 28.86–28.80)				
1001	05	OH	Republic Steel Corp. Quarry.	Elyria.
1002	07	MO	Conservation Chemical Co.	Kansas City.
1003	07	MO	Westlake Landfill	Bridgeton.
1004	05	MN	Reich Post & Pole.	Sebeka.
1005	06	LA	Bayou Bonfouca	Slidell.
1006	09	CA	Intel Corp. (Mountain View Plant).	Mountain View.
1007	09	CA	Raytheon Corp	Mountain View.
1008	09	CA	Hewlett-Packard (620–40 Page Mill).	Palo Alto.
1009	05	MN	Agate Lake Scrapyard.	Fairview township.
1010	05	MI	Adam's Plating	Lansing.
1011	06	AR	Jacksonville Municipal Landfill.	Jacksonville.
1012	06	AR	Rogers Road Municipal Landfill.	Jacksonville.
1013	03	VA	Saltville Waste Disposal Ponds.	Saltville.
1014	01	ME	Saco Municipal Landfill.	Saco.
1015	04	SC	Palmetto Recycling, Inc.	Columbia.
1016	01	MA	Shpack Landfill	Norton/Attleboro.
1017	03	PA	Kimberton Site	Kimberton Borough.
1018	04	TN	Mallory Capacitor Co.	Waynesboro.
1019	01	MA	Norwood PCBs	Norwood.
1020	02	NY	Warwick Landfill	Warwick.
1021	02	NY	Sidney Landfill	Sidney.
1022	02	NY	Seaboard Reclamation, Inc.	Lisbon.
1023	10	WA	Old Inland Plt	Spokane.
1024	10	WA	Pasco Sanitary Landfill (Yakima).	Yakima.
1025	05	IN	Lemon Lane Landfill.	Bloomington.
1026	05	IN	Tri-State Plating	Columbus.
1027	10	ID	Arrcom (Dresser Enterprises).	Rathdrum.
1028	01	NH	Coakley Landfill	North Hampton.
1029	04	NC	Potter's Septic Tank Service Pits.	Maco.
1030	04	KY	Green River Disposal, Inc.	Maceo.
1031	04	NC	ABC One Hour Cleaners.	Jacksonville.
1032	03	PA	Fischer & Porter Co.	Warminster.
1033	03	PA	Elizabethtown Landfill.	Elizabethtown.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
1034	05	IL	Central Illinois Public Serv Co.	Taylorville.
1035	06	AR	Arlowood, Inc	Omaha.
1036	09	CA	Jibboom Junkyard.	Sacramento.
1037	02	NJ	A. O. Polymer	Sparta Township.
1038	05	WI	Wausau Ground Water Contamination.	Wausau.
1039	02	NJ	Dover Municipal Well 4.	Dover Township.
1040	02	NJ	Rockaway Township Wells.	Rockaway.
1041	02	NJ	Pohatcong Valley Ground Water Con.	Warren County.
1042	02	NJ	Garden State Cleaners Co.	Minotola.
1043	03	DE	Sussex County Landfill No. 5.	Laurel.
1044	03	PA	North Penn—Area 12.	Worcester.
1045	03	PA	Dublin TCE Site	Dublin Borough.
1046	05	WI	Delavan Municipal Well #4.	Delavan.
1047	05	WI	Waste Management (Brookfield Lf).	Brookfield.
1048	07	MO	North-U Drive Well Contamination.	Springfield.
1049	07	NE	10th Street Site	Columbus.
1050	09	CA	San Gabriel Valley (Area 3)	Alhambra.
1051	09	CA	San Gabriel Valley (Area 4).	La Puente.
1052	09	CA	Watkins-Johnson Co. (Stewart Div).	Scotts Valley.
1053	09	CA	Intersil Inc./ Siemens Components.	Cupertino.
1054	09	CA	Modesto Ground Water Contamin.	Modesto.
1055	10	WA	American Lake Gardens.	Tacoma.
1056	10	WA	Greenacres Landfill.	Spokane County.
1057	10	WA	Northside Landfill.	Spokane.
1058	06	OK	Sand Springs Petrochemical Cmplx.	Sand Springs.
1059	06	TX	Passaic Chemical Co.	Fort Worth.
1060	05	MI	Metal Working Shop.	Lake Ann.
1061	05	MN	East Bethel Demolition Landfill.	East Bethel Township.
1062	06	TX	Triangle Chemical Co.	Bridge City.
1063	02	NJ	PJP Landfill	Jersey City.
1064	03	PA	Craig Farm Drum	Parker.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
1065	05	IL	Belvidere Municipal Landfill.	Belvidere.
1066	07	MO	Bee Cee Manufacturing Co.	Malden.
1067	03	PA	CryoChem, Inc	Worman.
1068	02	NJ	Kauffman & Minteer, Inc.	Jobstown.
1069	03	PA	Lansdowne Radiation Site.	Lansdowne.
1070	02	NY	Forest Glen Mobile Home Subdivis.	Niagara Falls.
1071	02	NY	Pasdium Chemical Co., Inc.	New York City.
Number of NPL Sites: 1071.				

* State top priority site.

NATIONAL PRIORITIES LIST, FEDERAL SECTION (BY GROUP)

[August 1990]

NPL Gr 1	St	Site name	City/county
1	WA	Hanford 200-Area (USDOE).	Benton County.
1	WA	Hanford 300-Area (USDOE).	Benton County.
1	CO	Rocky Flats Plants (USDOE).	Golden.
1	CA	Riverbank Army Ammunition Plant.	Riverbank.
1	NM	Cal West Metals (USSBA).	Lemitar.
1	MO	Weldon Spring (USDOE/Army).	St. Charles County.
2	CO	Rocky Mountain Arsenal.	Adams County.
2	TN	Milan Army Ammunition Plant.	Milan.
2	CA	McClellend AFB (Ground Water Cont).	Sacramento.
2	PA	Naval Air Develop Center (8 Areas).	Warminster Township.
2	OH	Wright-Patterson Air Force Base.	Dayton.
3	ID	Mountain Home Air Force Base.	Mountain Home.
3	OH	Feed Materials Prod Cent (USDOE).	Fernald.
3	WA	Bangor Naval Submarine Base.	Silverdale.
3	UT	Tooele Army Depot (North Area).	Tooele.
3	WA	Bonneville Power Adm Ross (USDOE).	Vancouver.
3	MO	Aberdeen Prov Ground-Edgewood Area.	Edgewood.
4	ID	Idaho National Engin Lab (USDOE).	Idaho Falls.
4	AL	Anniston Army Depot (SE Ind Area).	Anniston.
4	GA	Robins AFB (Landfill #4/Sludge Lag).	Houston County.

NATIONAL PRIORITIES LIST, FEDERAL SECTION (BY GROUP)—Continued

[August 1990]

NPL Gr 1	St	Site name	City/county
4	TN	Oak Ridge Reservation (USDOE).	Oak Ridge.
4	NE	Cornhusker Army Ammunition Plant.	Hall County.
4	NJ	Naval Air Engineering Center.	Lakehurst.
5	UT	Hill Air Force Base	Ogden.
5	CA	Treasure Island Nav Sta-Hun Pt An.	San Francisco.
5	AK	Eielson Air Force Base.	Fairbanks N Star Bor.
6	SC	Savannah River Site (USDOE).	Aiken.
5	WA	Naval Air Sta, Whid le (Auft).	Whidbey Island.
6	NJ	W.R. Grace/Wayne Int Stor (USDOE).	Wayne Township.
6	WA	Hanford 100-Area (USDOE).	Benton County.
6	AK	Standard Steel & Met Sal Yd (USDOT).	Anchorage.
6	MA	Otis Air Nat Guard/ Camp Edwards.	Falmouth.
7	AK	Elmendorf Air Force Base.	Greater Anchorage Bor.
7	UT	Ogden Defense Depot.	Ogden.
7	GA	Marine Corps Logistics Base.	Albany.
7	CA	Sacramento Army Depot.	Sacramento.
8	IL	Sangamo/Crab Orchard NWR (USDOI).	Carterville.
8	ME	Brunswick Naval Air Station.	Brunswick.
8	CO	Air Force Plant PJKS.	Waterton.
8	NJ	Picatinny Arsenal	Rockaway Township.
8	FL	Homestead Air Force Base.	Homestead.
8	AK	Fort Wainwright	Fairbanks N Star Bor.
8	FL	Pensacola Naval Air Station.	Pensacola.
9	CA	Sharpe Army Depot	Lathrop.
9	MA	Fort Devens	Fort Devens.
9	OK	Tinker AFB (Soldier Cr/Bldg 3001).	Oklahoma City.
9	CA	Lawrence Livermore Lab (USDOE).	Livermore.
9	CA	Fort Ord	Marina.
9	WA	McChord AFB (Wash Rack/ Treatment).	Tacoma.
9	IL	Savanna Army Depot Activity.	Savanna.
10	NY	Brookhaven National Lab (USDOE).	Upton.
10	TX	Air Force Plant #4 Genar Dynamics.	Fort Worth.
11	TX	Longhorn Army Ammunition Plant.	Karnack.
11	CA	Norton Air Force Base.	San Bernardino.
11	NJ	Federal Aviation Admin Tech Cent.	Atlantic County.
11	WA	Naval Air Sta, Whid le (Seaplane).	Whidbey Island.

NATIONAL PRIORITIES LIST, FEDERAL SECTION (BY GROUP)—Continued

[August 1990]

NPL Gr 1	St	Site name	City/county
11	NH	Pease Air Force Base.	Portsmouth/ Newington.
11	NM	Lee Acres Landfill (USDOI).	Farmington.
11	WY	F.E. Warren Air Force Base.	Cheyenne.
12	CA	Castle Air Force Base.	Merced.
12	AZ	Luke Air Force Base	Glendale.
12	AZ	Williams Air Force Base.	Chandler.
12	PA	Tobyhanna Army Depot.	Tobyhanna.
12	CA	Barstow Marine Corps Logist Base.	Barstow.
13	PA	Letterkenny Army Depot (POO Area).	Franklin County
13	CA	El Toro Marine Corps Air Station.	El Toro.
13	NJ	Fort Dix (Landfill Site).	Pemberton Township.
13	CA	Tracy Defense Depot.	Tracy.
13	AL	Alabama Army Ammunition Plant.	Childersburg.
13	CT	New London Submarine Base.	New London.
13	WA	Hanford 1100-Area (USDOE).	Benton County.
13	DE	Dover Air Force Base.	Dover.
13	UT	Monticello Mill Tailings (USDOE).	Monticello.
14	MA	Fort Devens-Sudbury Training Ann.	Middlesex County.
14	NY	Seneca Army Depot	Romulus.
14	WA	Fort Lewis Logistics Center.	Tillicum.
15	IL	Joliet Army Ammu Plant (LAP Area).	Joliet.
15	OH	Mound Plant (USDOE).	Miamisburg.
15	RI	Davisville Naval Constr Batt Cent.	North Kingstown.
15	ME	Loring Air Force Base.	Limestone.
15	PR	Naval Security Group Activity.	Sabana Seca.
16	PA	Letterkenny Army Depot (SE Area).	Chambersburg.
16	NY	Griffiss Air Force Base.	Rome.
16	VA	Defense General Supply Center.	Chesterfield County.
16	KS	Fort Riley	Junction City.
16	WA	Fort Lewis (Landfill No. 5).	Tacoma.
16	CA	Camp Pendleton Marine Corps Base.	San Diego County.
17	MO	Lake City Army Plant (NW Lagoon).	Independence.
17	MN	Twin Cities Air Force (SAR Landfill).	Minneapolis.
17	CA	Edwards Air Force Base.	Kern County.
17	SD	Ellsworth Air Force Base.	Rapid City.
17	CA	George Air Force Base.	Victorville.
17	WA	Naval Undersea Warf Sta (4 Areas).	Keyport.
17	NC	Camp Lejeune Military Reservation.	Onslow County.
18	RI	Newport Naval Educat/Training Cen.	Newport.
18	AZ	Yuma Marine Corps Air Station.	Yuma.
18	FL	Jacksonville Naval Air Station.	Jacksonville.
18	IL	Joliet Army Ammu Plant (Mfg Area).	Joliet.
18	FL	Cecil Field Naval Air Station.	Jacksonville.
18	WA	Fairchild Air Force Base (4 Areas).	Spokane County.
19	CA	March Air Force Base.	Riverside.
19	TX	Lone Star Army Ammunition Plant.	Texarkana.
19	CA	Lawrence Livermore Lab-300 (USDOE).	Livermore.
19	OR	Umatilla Army Depot (Lagoons).	Hermiston.
19	MD	Aber Prov Ground-Michaelsville Lf.	Aberdeen.
20	MN	Naval Industrial Reserve Ordnance.	Fridley.
20	WA	Bangor Ordnance Disposal.	Bremerton.
20	NY	Plattsburgh Air Force Base.	Plattsburgh.
20	LA	Louisiana Army Ammunition Plant.	Doyline.
20	MO	Weldon Spring Farm Army Ord Works.	St. Charles County.
21	IA	Iowa Army Ammunition Plant.	Middletown.
21	NJ	Naval Weapons Stat Earle (Site A).	Colts Neck.
21	CA	Travis Air Force Base.	Solano County.
21	CA	Moffett Naval Air Station.	Sunnyvale.
22	CA	Mather Air Force Base.	Sacramento.
22	HI	Schofield Barracks	Oahu.

Number of NPL Federal Facility Sites: 116

* State top priority site.

1 Sites are placed in groups (Gr) corresponding to groups of 50 on the final NPL.

[FR Doc. 90-20385 Filed 8-29-90; 8:45 am]

BILLING CODE 6560-50-M

(1) 4-3-13

From NUREG-1308 Rev. 1

West Lake Landfill

74,300 tons Belg. Congo pitchblende raffinate of which 113 tons is U
32,000 " Colorado " " " 48 " " "
8,700 " leached barium sulfate " " 7 " " "

→ residues partly to Cannon City, Colorado.

'69 Remaining material sold to Cotter.
'69 - '73 material except 8,700 $BaSO_4$ shipped to Cannon City.
'74 NRC inspection : 8700 tons of $BaSO_4$ + 39,000 tons of top soil → local landfi
'76 " " : 43,000 " " waste + soil dumped in West Lake + 3' soil cover
'80 (since '81) RMC survey. '82 NUREG/CR-2722 provides results
'83 - ORAU, UMC → characterize site + propose remediation.
'86 ORAU sampled well water → Banerjee (& UMC) report in preparation as of '88.

Area 2 - 13 acres over 16-20 ft of landfill debris. 130,000 yd^3 of cont
x2-13 ft.
Some contamination on surface.
Beneath landfill debris 3-7 ft top soil + 30-50 ft sand and gravel alluv

Area 1 - 3 acres over 50-60 ft. of landfill debris. 20,000 yd^3 of cont. a
3-5 ft. cover
Beneath landfill debris lies limestone bedrock.

Surface runoff to Missouri River.

Two aquifers : ① Missouri River alluvium
② Shallow limestone bedrock

Water table of floodplain ~ 10 ft below surface.
Leachate migrates in a N 30° W direction.

B/17

½ of the rainwater infiltrates landfill.

1 well 1.4 miles N 35° W of landfill

'80 – '81 RMC survey.
Highest external γ level ~ 1600 μR/hr after 4 ft of fill added to 3 ft.
Area 2 ~ 2 acres above 20 μR/hr
Area 1 ~ few thousand square feet.
Soil samples indicate U + Th decay chain radionuclides & K-40.
Background ~ 2 pCi/g of Ra-226
Onsite ~ 1 – 21,000 pCi/g Ra-226; 10 – 2100 pCi/g U-238
Surf. soils contain high levels of Th-230.
Subsurface soils 1 pCi/gm – 22,000 pCi/gm Ra-226.
Subsurface contamination 2-15 ft. thick covering 16 acres.

Background; dir. γ exp 8 – 10.6 μR/hr
Ra-226 soil conc. 2.5 – 2.6 pCi/gm
Rn flux .5 – .58 pCi/m².s .0011, .0017, .005 WL

Rn flux .2 – 825 pCi/m².s App. B
Butler Bldg. ~ 1/30 of WL which is 10 CFR 20, limit for unrestricted area
No elevated levels in vegetation samples.
37 water samples. 1 sample = EPA limit of 15 pCi/l for gross α
Several samples > " " " gross β → K-40
water analysis → RMC
All offsite water samples < EPA limits.
Background 1.5 pCi/l gross α; 30 pCi/l gross β

MDNR - 11 water samples

1 gw @ 15 pCi/l gross α , 1 sw @ 45 pCi/l gross α .

Most locations > 50 pCi/l gross β .

'83 11 perimeter wells sampled → 1 exceeded 15 pCi/l gross α .
'84 11 " " " " → 1 " " " " " "
'86 44 " " " " → 1 " " " " " "

U-238 : Ra-226 ~ 2:1 - 10:1 Th-230 . Ra-226 ~ 1:1 - 40:1 ← RMC
70:1 ← 1984 survey data
100:1 - 300:1 ← Literature (which are not in natural equilibrium)
100:1 ← used by NRC

Rad. impacts from U-238, Th-230 and Ra-226

Mean Ra-226 conc. of 90 pCi/g.
" Th-230 " " 9000 " } estimated
" U-238 " " 18 "

100 yrs Ra-226 ↑ factor of 5 i.e. exceed BTP using 40:1
1000 " " ↑ 14 Ci 35
NRC BTP 100 pCi/g Ra-226 1400 Ci 5x conservatively large
3 Ci

Option

		$ 1984 est.
A	:- Leave as is	
B	:- } leave onsite + some Rn + δ controls	$ 370,000
C	:- }	
D	:- Excavate material and ship offsite.	$ 2,500,000 - 25,000,000 (est. by mass)
E	:- Build onsite earthen cell	
F	:- Build slurry wall down gradient	$ 5,500,000

Waste requiring disposal 60,000 - 150,000 tons.

(B)

Ra-226 ~ 90 pCi/g

$T_{\frac{1}{2}} = 1622$ yr.

$\lambda_B = \frac{\ln 2}{1622} = 4.27 \times 10^{-4}$ 1/yr

(A)

Th-230 ~ 9000 pCi/g.

$T_{\frac{1}{2}} = 80\,000$ yr.

$\lambda_A = \frac{\ln 2}{80\,000} = 8.66 \times 10^{-6}$ 1/yr

$$A_B = \frac{\lambda_B A_{OA}}{\lambda_B - \lambda_A} \left(e^{-\lambda_A t} - e^{-\lambda_B t}\right)$$

$$90 = \frac{4.27 \times 10^{-4} \times 9000}{4.27 \times 10^{-4} - 8.66 \times 10^{-6}} \left[e^{-8.66 \times 10^{-6} t} - e^{-4.27 \times 10^{-4} t}\right]$$

$$9.8 \times 10^{-3} = e^{-8.66 \times 10^{-6} t} - e^{-4.27 \times 10^{-4} t}$$

$t \simeq$ 23-24 yrs. assuming pure Th-230 initially.

100 yrs $A_B = \frac{4.27 \times 10^{-4} \times 9000}{4.27 \times 10^{-4} - 8.66 \times 10^{-6}} \left[e^{-8.66 \times 10^{-6} \times 100} - e^{-4.27 \times 10^{-4} \times 100}\right]$

$= 376$ $\qquad 376/90 \simeq 4.2$

If 20:1 then:

$$1 = \frac{4.27 \times 10^{-4} \times 20}{4.27 \times 10^{-4} - 8.66 \times 10^{-6}} \left[e^{-8.66 \times 10^{-6} t} - e^{-4.27 \times 10^{-4} t}\right]$$

$t \simeq$ 130 yrs. assuming pure Th-230 initially.

Oak Ridge LLW disposal: in facility $\simeq 10^5$ m^3 in volume which is also the approximate volume of the contamination in the whole landfill.

{ U-238 → it moves from 25 pCi/g via gw-well pathway
Th-232 → 10 " " 0.2 g " " dir. & exposure following capping

Not an immediate hazard since ~~the material has not~~ there is an absence of significant contamination in the leachate liquid or sludge.

~~Highest Ra-226~~

Ratio of Th-230 to Ra-226 ⇒ 20:1

Ext. γ @ surface > 20 μR/hr ~ 12 acres

Subsurface cont. > 5 pCi/g ~ 17 acres

'76 Report in St. Louis Post Dispatch [3] that rad. material was dumped in West Lake Landfill 1973.

'76 NRC investigation [4] → 7 tons of U_3O_8 in 8700 tons of leached $BaSO_4$ residues mixed with 39,000 tons of soil was disposed at West Lake Landfill.

'78 Aerial (60m) survey showed >100 MR/hr extrapolated to 1 m level identified an additional contaminated area (Area 2).

Aug '80 RMC survey performed.

Surface soil samples (Area 2 only) { 1 - 21,000 pCi/g Ra-226.
10 - 2,100 pCi/g U-238

Elevated levels of Th-230 (Th-230 : Ra-226 = 20)
See v Th-230 : Ra-226 = 5 - 50

Subsurface large volumes exceeding 5 pCi/g of Ra-226.

from plots { ~~Area 1 ~ 10' thick x 200' wide x 200' long $\frac{1}{2} 0.4 \times 10^6$ ft^3 = 1x~~
~~Area 2 ~ 20' " x 150' " x 820' " $\frac{1}{2} 0.4 \times 10^6$ ft^3 = 3x~~

Approaching equilibrium with Th-230, Ra-226 concentrations are expected to increase substantially.

Thorium resulted in the seperation of Uranium and Radium.

All Groundwater samples were below MPC of Ra-226. Thorium is highly insoluble in addition to having a large Kd. Uranium & Radium have high Kds. Therefore ~~not much is expected to reach the~~ peak concentrations in groundwater ~~would~~ will occur ~~later~~ in the distant future.

Chemical analyses show high concentrations of barium and sulfate.

40,000 tons of hotly rad. material diluted at the ~~site~~ landfill by about a factor of 4.

K·E·I
CONSULTANTS
INCORPORATED

7929 Reindeer Trail
San Antonio, Texas 78256
512/680-5767

May 4, 1990

Subject: Freedom of Information Request

Mr. A. Bert Davis
FOIA Regional Administrator
Department of Natural Resource
799 Roosevelt
Glen Ellyn, IL 60137

FREEDOM OF INFORMATION
ACT REQUEST
FOIA-90-210
Rec'd 5-7-90

Dear Mr. Davis:

KEI Consultants, Inc. is currently performing an environmental site assessment of properties Bri[illegible]eton, Missouri. We respectfully request a copy of the facility file for the former Westlake Landfill (located at 13570 St. Charles Rock Road, Bridgeton, Missouri 63044) be forwarded to our office for review at your earliest convenience. We are specifically interested in information pertaining to dumping of low-level uranium waste ore at this site.

Please contact me if you have any questions concerning this request.

Sincerely,

KEI CONSULTANTS, INC.

Ty Farris, Project Manager

B/18

UNITED STATES
ATOMIC ENERGY COMMISSION

Post Office Box 470
St. Charles, Missouri 63301

IN REPLY REFER TO:
SAILING

SEP 27 1966

Mr. J. J. Donovan
Executive Vice President
Continental Mining & Milling Co.
Suite 830 - 208 South LaSalle St.
Chicago, Illinois 60604

Subject: CONTRACT NO. AT-(29-2)-56, MODIFICATION NO. 1

Dear Mr. Donovan:

We are in receipt of your letter of September 20 returning three signed copies of the subject contract modification and forwarding a cashier's check in the amount of $14,000. Attached is one fully executed copy of the contract modification.

This is your authority to remove the material purchased under the subject contract modification. Your prompt action in this matter is appreciated.

If we can be of further assistance, please let us know.

Very truly yours,

F. H. Belcher
Area Manager

Enclosure:
Executed cy of
Mod. 1

cc: Mr. R. H. Miller, OROO
w/cy encl.

NOTE: Cashier's check in the amount of $14,000 was sent to the OROO Finance Division on Form OR-597 September 26, 1966.

9004250206

3 pp.

Contract No. AT-(23-2)-56
CONTINENTAL MINING & MILLING CO.
Modification No. 1

SUPPLEMENTAL BILL OF SALE

WHEREAS, the UNITED STATES OF AMERICA (hereinafter called the "Government"), acting by and through the UNITED STATES ATOMIC ENERGY COMMISSION (hereinafter called the "Commission"), has heretofore conveyed to CONTINENTAL MINING & MILLING CO. (hereinafter called the "Purchaser"), a Delaware corporation, whose principal office is located at 208 South LaSalle Street, Chicago, Illinois, certain personal property located at St. Louis, Missouri, described in Bill of Sale, dated February 25, 1966, designated as Contract No. AT-(23-2)-56; and

WHEREAS, the Government desires to sell, and the Purchaser desires to buy, additional personal property similarly located;

NOW, THEREFORE, for and in consideration of the sum of Fourteen Thousand Dollars ($14,000.00) cash in hand paid, receipt of which is acknowledged, the Government hereby bargains, sells, and conveys to the Purchaser approximately 3500 tons of C-liner slag stored on the east end of a Government-owned site located at 50 Brown Road, Robertson, Missouri, as shown on Drawing No. 6-1403-19 attached to the original Bill of Sale designated as Contract No. AT-(23-2)-56.

THIS SUPPLEMENTAL BILL OF SALE is subject to all of the terms and conditions of Bill of Sale, dated February 25, 1966, designated as Contract No. AT-(23-2)-56 as if incorporated herein except as follows:

a. The furnishing of an additional performance bond by the Purchaser is not required.

b. The material purchased under this Supplemental Bill of Sale shall be completely removed within the 400 calendar days prescribed in Paragraph 5. b. of Contract No. AT-(23-2)-56.

c. Payment of the purchase price in full shall be made by the Purchaser upon execution and delivery of this Supplemental Bill of Sale at which time title to the material sold hereunder shall pass to the Purchaser.

IN WITNESS WHEREOF, the United States Atomic Energy Commission has caused this Supplemental Bill of Sale to be executed in the name of and on behalf of the Government by its duly authorized representative this 28th day of September, 1966.

UNITED STATES OF AMERICA

BY: UNITED STATES ATOMIC ENERGY COMMISSION

BY: ______________________
F. H. Belcher
Area Manager
St. Louis Area Office

STATE OF MISSOURI)
COUNTY OF ST. CHARLES)

Before me, John R. Renshaw, a Notary Public of the State and County aforesaid, personally appeared F. H. Belcher, with whom I am personally acquainted, and who, upon oath, acknowledged himself to be a duly authorized representative of the United States Atomic Energy Commission, an Agency of the United States of America, and that he as such authorized representative, being duly authorized so to do,

himself as such authorized representative.

Witness my hand and seal at office in Weldon Spring, St. Charles County, Missouri, this [illegible] day of [illegible], 1966.

[illegible]
Notary Public

My commission expires the [illegible]
day of [illegible], 19[illegible].

Accepted this 23rd day of September, 1966, on the terms and conditions hereinabove set forth.

CONTINENTAL MINING & MILLING CO.

BY: [illegible]

TITLE: Executive Vice President

ATTEST:

BY: [illegible]

TITLE: Secretary

SITE CHARACTERIZATION AND
REMEDIAL ACTION CONCEPTS FOR
THE WEST LAKE LANDFILL

Docket No. 40-8801

Manuscript Completed: July 1989
Date Published: July 1989

Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

B/19

83 WP

PREFACE

This report has as its basis a characterization of the West Lake Landfill site and evaluation of some potential remedial measures performed primarily by S. K. Banerji, W. H. Miller, J. T. O'Connor and L. S. Uhazy of the University of Missouri-Columbia. The Nuclear Regulatory Commission received the first and second drafts, then titled "Engineering Evaluation of Options for Disposition of Radioactively Contaminated Residues Presently in the West Lake Landfill, St. Louis County, Missouri," in 1984; thus most of the information in this report dates from 1983-1984. However, some more recent data, principally water sampling results, have been added. Waste disposal and other industrial activities have continued on the 200 acre site, as have activities in the vicinity, resulting in changes in details of topography, roads, etc. To provide a more complete view of the radioactive material in the landfill, use has been made of figures from the report titled "Radiological Survey of the West Lake Landfill, St. Louis County, Missouri," NUREG/CR-2722, May 1982.

The remedial action concepts in this report are those proposed by the contractor. Judgments expressed in this report about these concepts are in general those of the contractor, and do not necessarily represent the views of the Nuclear Regulatory Commission. For example, the cost estimates for these concepts are based on radium-226 concentrations whereas the long-term issue is dependent upon the thorium-230 concentrations.

Although some of its information has not been updated since 1984, this report is being released so as to make its collected information available to interested parties.

ABSTRACT

The West Lake Landfill is near the city of St. Louis in Bridgeton, St. Louis County, Missouri. In addition to municipal refuse, industrial wastes and demolition debris, about 43,000 tons of soil contaminated with uranium and its radioactive decay products were placed there in 1973. After learning of the radioactive material in the landfill, the U.S. Nuclear Regulatory Commission (NRC) had a survey of the site's radioactivity performed and, in 1983, contracted, through Oak Ridge Associated Universities (ORAU), with the University of Missouri-Columbia (UMC) to characterize the environment of the site, conduct an engineering evaluation, and propose remedial measures. This report presents a description of the results of the UMC work, providing the environmental characteristics of the site, the extent and characteristics of the radioactive material there, some considerations with regard to potential disposal of the material, and some concepts for remedial measures.

CONTENTS

CONTENTS (Continued)

TABLES (Continued)

SUMMARY

In 1973, approximately 7900 metric tons (mt) (8700 short tons) of radioactively contaminated barium sulfate ($BaSO_4$) residues were mixed with about 35,000 mt (39,000 t) of soil, and the entire volume was placed in the West Lake Landfill in St. Louis County, Missouri. This material resulted from decontamination efforts at the Cotter Corporation's Latty Avenue plant where the material had been stored. Disposal in the West Lake Landfill was not authorized by the Nuclear Regulatory Commission (NRC) and was contrary to the disposal location indicated in the NRC records. State officials were not notified of this disposal since the landfill was not regulated by the State at the time. Although the contamination does not present an immediate health hazard, authorities have been concerned about whether this material poses a long-term health hazard to workers and residents of the area and what, if any, remedial action is necessary.

In 1980-81, Radiation Management Corporation (RMC) of Chicago, Illinois, performed a detailed radiological survey of the West Lake Landfill under contract to the NRC (NUREG/CR-2722). This survey was performed to determine the extent of radiological contamination. Before this survey, little was known about the location or activity of radionuclide-bearing soils in the landfill. This survey showed that the radioactive contaminants are in two areas. The northern area (Area 2) covers about 13 acres. The radioactive debris forms a layer 2 to 15 feet thick, exposed in only a small area on the landfill surface and along the berm on the northwest face of the landfill. The southern area (Area 1) contains a relatively minor fraction of the debris covering approximately 3 acres with most of the contaminated soil buried with about 3 feet of clean soil and sanitary fill.

The RMC survey showed that the radioactivity is from the naturally occurring U-238 and U-235 series with Th-230 and Ra-226 as the radionuclides that dominate radiological impact. The survey data indicate that the average Ra-226 concentration in the radioactive wastes is about 90 pCi per gram; the average Th-230

concentration is estimated to be about 9000 pCi per gram. Since Ra-226 has been depleted with respect to its parent Th-230, Ra-226 activity will increase in time (for example, over the next 200 years, Ra-226 activity will increase ninefold over the present level). This increase in Ra-226 must be considered in evaluating the long-term hazard posed by this radioactive material.

In addition to RMC's radiological survey, soil and water samples were collected and analyzed by others, including Oak Ridge Associated Universities (ORAU), and the University of Missouri-Columbia (UMC). Occasionally a sample of water from a monitoring well exceeds slightly the EPA drinking water standard of 15 pCi gross alpha per liter. Sample analyses for priority pollutants (non-radioactive hazardous substances) show a number of listed pollutants are present.

On the basis of radiological surveillance conducted by RMC, UMC, and ORAU, the following areas of concern have been identified:

(1) Radioactive soil is eroding from the northwestern face of the berm, and is being transported off site.

(2) Radon gas had been observed to accumulate to an unacceptable level in the Butler-type building on site. This building has since been removed.

(3) Some degree of radiological contamination has been found in the wells that monitor the perimeter.

(4) Surface exposure rates over much of the contaminated areas are greater than 20 μR/hr.

In March 1983, the NRC through ORAU, contracted with UMC to conduct an engineering evaluation of the site and propose possible remedial measures for NRC's consideration for dealing with the radioactive waste at the West Lake Landfill. The following six remedial options were proposed and evaluated in this study.

- Option A - No remedial action
- Option B - Stabilization onsite with restricted land use

- Option C - Extending the landfill offsite with restricted land use
- Option D - Removal and relocation of the contaminated material to an authorized disposal site
- Option E - Excavation and temporary onsite storage in a trench
- Option F - Construction of a slurry wall to prevent leachate from migrating off site

It is noted that some of the above alternatives for remedial action were initially evaluated with the objective of permanent disposal of the waste at the site.

1 INTRODUCTION

The West Lake Landfill is located in St. Louis County, Missouri, 6 km (3.7 miles) west of Lambert Field International Airport (Figure 1.1) and southwest of St. Charles Rock Road in Bridgeton, Missouri. The site has been used since 1962 for disposing of municipal refuse, industrial solid and liquid wastes, and construction demolition debris. In addition, the landfill is an active industrial complex on which concrete ingredients are measured and combined before mixing ("batching"), and asphalt aggregate is prepared. Limestone ceased to be quarried in the spring of 1987.

In 1973, 7900 metric tons [(mt) (8700 short tons)] of radioactively contaminated barium sulfate ($BaSO_4$) residues from uranium and radium processing were mixed with an estimated 35,000 mt (39,000 tons) of soil and deposited in the West Lake Landfill. Previously, this material was located at the Cotter Corporation's Latty Avenue facility in Hazelwood, Missouri, and was removed during decontamination work. It is not known what levels of contamination were already in the soil before the barium sulfate residues were mixed into it. Disposal in the West Lake Landfill was unauthorized and contrary to the disposal location indicated in the U.S. Nuclear Regulatory Commission's (NRC's) records.

Subsequently, the NRC sponsored studies that were directed at determining the radiological status of the landfill. In 1978, an aerial radiological survey revealed two areas within the landfill where the gamma radiation levels indicated radioactive material had been deposited. A more extensive survey was initiated in November 1980 by the Radiation Management Corporation (RMC) under contract to the NRC.

In March 1983, the NRC through Oak Ridge Associated Universities (ORAU) contracted with the University of Missouri-Columbia Department of Civil Engineering to describe the environmental characteristics of the site, conduct an engineering evaluation, and propose possible remedial measures for dealing with the radioactive waste at the West Lake Landfill. In May 1986, ORAU sampled water from

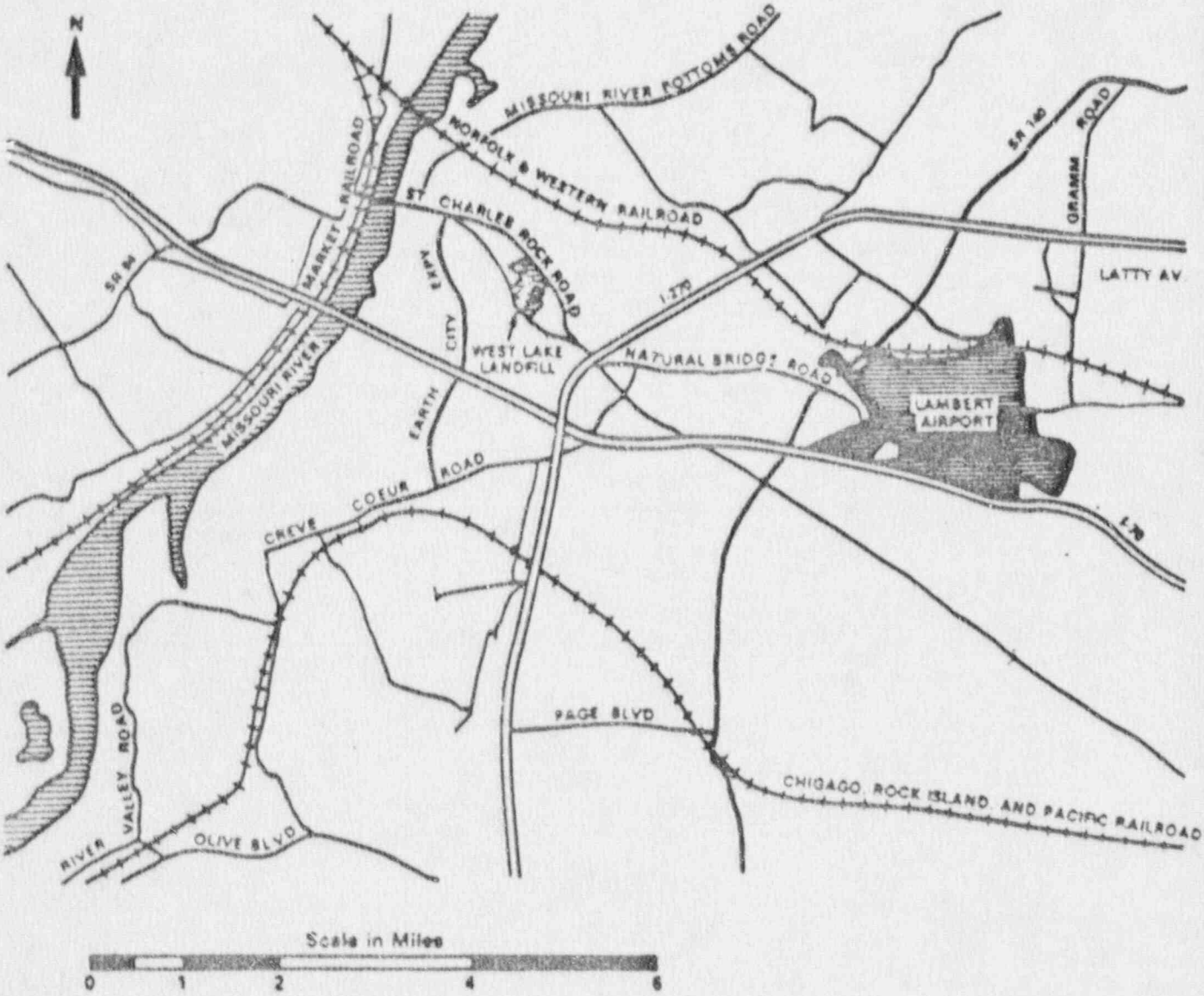

Figure 1.1 Location of West Lake Landfill

wells on and close to the landfill to determine if the radioactive material had migrated into the groundwater.

Information from all these sources forms the basis for this report.

2 SITE DESCRIPTION

This chapter presents a historical and environmental description of the West Lake Landfill site located in St. Louis County, Missouri.

2.1 Location

The 81-hectare (ha) (200-acre) West Lake Landfill property is situated between the St. Charles Rock Road and the Old St. Charles Rock Road in Bridgeton, Missouri. The southeastern and northwestern parts of the landfill abut farmland. Several commercial and industrial facilities are located near the landfill (Figure 2.1). The nearest residential area is a trailer park located approximately 1 km (0.6 mile) to the southeast. A major portion of the landfill (roughly the northern three-fourths of the site) is located on the floodplain, approximately 2 km (1.2 miles) from the Missouri River.

2.2 Zoning

The zoning plan obtained from the Bridgeton Planning and Zoning Department for properties on and adjacent to the landfill is shown in Figure 2.2. A portion of the landfill, including site Area 1, is zoned M-1, which is designated for light manufacturing; the northwest part of the landfill, including Area 2, is zoned as single-family residential (R-1). This R-1 zoning indicates the use to which the land was originally intended. However, the landfill was extended over the land zoned R-1, and the zoning plan was simply not changed to reflect the new usage. Other discrepancies between land use and zoning are found in the nearby Earth City Industrial Park (William Canney, Safety Supervisor of West Lake Landfill, Inc., personal communication, March 1984). The land across St. Charles Rock Road is zoned for light and heavy manufacturing. The remainder of the property surrounding the landfill is zoned residential and business.

2.3 History

The West Lake Landfill was started in 1962 for the disposal of municipal and industrial solid wastes, and to fill in the excavated pits from the quarry operations that had been performed at the site since 1939 (Canney, personal communication, March 1984). In 1974, the landfill was closed by the Missouri Department of Natural Resources (MDNR) (Karch, 1976). A new sanitary landfill, in an area of the West Lake Landfill property which is protected from groundwater contact, now operates under an MDNR permit.

This new part of the landfill was opened in 1974. The bottom is lined with clay and a leachate collection system has been installed. Leachate is pumped to a treatment system consisting of a lime precipitation unit followed in series by an aerated lagoon and two unaerated lagoons. The final lagoon effluent is discharged into St. Louis Metropolitan Sewer District sewers.

The quarrying operation ceased in the spring of 1987 because not enough "good rock" was left at the site.

2.4 Ownership

The West Lake Landfill was owned from 1939 until 1988 by West Lake Landfill, Inc., of 13570 St. Charles Rock Road, Bridgeton, Missouri. Most of the landfill was sold in 1988 to Laidlaw Industries, Inc. The two areas which contain the radioactive material were retained by West Lake Properties as the principal properties of a subsidiary named Rock Road Industries, Inc.

2.5 Contaminated Areas

Radioactive contamination at the West Lake Landfill has been identified in two separate soil bodies (Figure 2.3). Comparisons of radionuclide quantities and of the activity ratios between radionuclides not in secular equilibrium, indicate that the radioactive contamination in the separate soil bodies was derived from the same source, i.e., the Cotter Corporation's former Latty Avenue facility in Hazelwood, Missouri (NRC, NUREG/CR-2722).

The northern area (referred to as Area 2) of contamination shown on Figure 2.3 covers an area of 5.2 ha (13 acres) and lies above 5 to 6 m (16-20 ft) of landfill debris. The contaminated soil forms a more or less continuous layer from 1 to 4 m (3 to 13 ft) in thickness, and amounts to approximately 100,000 m^3 (130,000 yd^3). Some of this contaminated soil is near or at the surface, particularly along the face of the northwestern berm. Beneath the landfill debris, the soil profile consists of 1 to 2 m (3 to 7 ft) of floodplain top soil overlying 10 to 15 m (33 to 50 ft) of sand and gravel alluvium.

The southern area of contamination (referred to as Area 1) shown on Figure 2.3 covers approximately 1.1 ha (3 acres) and contains roughly 15,000 m^3 (20,000 yd^3) of contaminated soil. This body of soil is located east of the landfill's main office at a depth of about 1 m (3 to 5 ft), and is located over a former quarry pit, which was filled in with debris. The depth of debris beneath the contaminated soil is unknown, but is estimated to be 15 to 20 m (50 to 65 ft). Limestone bedrock underlies the landfill debris.

2.6 Topography

About 75% of the landfill site is located on the floodplain of the Missouri River. The site topography is subject to change because of the types of activities (e.g., landfilling and quarrying) performed there. Figure 2.3 shows a contour map of the site as of July 1986. The surface runoff follows several surface drains and ditches which run in a northwest direction and drain into the Missouri River.

2.7 Geology

2.7.1 Bedrock

Bedrock beneath the West Lake Landfill consists of Mississippian age limestone of the Meramacean Series of the St. Louis and Salem formations, which extends downward to an elevation of 58 m (190 ft) mean sea level (msl) (Figure 2.4).*

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*Missouri Department of Natural Resources, Division of Geology and Land Survey, Rolla, Missouri, Well Log Files.

The limestone is dense, bedded, and fairly pure except for intermittent layers which consist of abundant chert nodules. The Warsaw Formation--also of Mississippian age--lies directly beneath the limestone. The Warsaw is made up of approximately 12 m (38 ft) of slightly calcareous, dense shale; this grades into shaley limestone toward the middle of the formation (Figure 2.4) (Spreng, 1961). Bedrock beneath the site dips at an angle of .5° to the northeast. Eight kilometers (5 miles) east of the site, the attitude of the bedrock is reversed by the Florissant Dome; the bedrock dips radially outward from the apex of this dome at a low angle (Martin, 1966).

Since karst (solution) activity often occurs in carbonate rocks, the possibility of its occurrence in the West Lake Landfill area was considered. Brief observation of the quarry walls at the landfill suggests that some solution of the limestone has occurred, but this solution activity has apparently been limited (see Section 2.8.1) to minor widening of joints and bedding planes near the bedrock surface. Although karst activity within the limestone is relatively minor, the upper surface of the bedrock is irregular and pitted as a result of solution (Lutzen and Rockaway, 1971). This alteration of the bedrock surface is greatest beneath the Missouri River floodplain.

2.7.2 Soils

Soil material in this area may be divided into two categories: Missouri River alluvium and upland loessal soil. This demarcation is shown as the historical edge of the alluvial valley in Figure 2.5. The division is made on the basis of soil composition, depositional history, and physical properties. Because the West Lake Landfill lies over this transition zone, the surface material at the site varies considerably from southeast to northwest.

The Missouri River alluvium (Figure 2.6) ranges in thickness from 12 m (40 ft) beneath the landfill site to more than 30 m (100 ft) at mid-valley (Figure 2.7). The upper 3 m (10 ft) of the soil profile consists of organic silts and clays, that have been deposited by the Missouri River during floods.* Below this

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*Missouri Department of Natural Resources, Division of Geology and Land Survey, Rolla, Missouri, Well Log Files.

surface layer, the soil becomes sandy and grades to gravel at depths greater than 5 to 10 m (16 to 33 ft). Because of the effects of channel scour, which continues to grade the sediment after its initial deposition, the alluvium is fairly homogeneous in a horizontal direction and becomes progressively coarser with depth (Goodfield, 1965). At the edges of the floodplain, the alluvium is not as well graded, and a large amount of fine material is present in the deeper sand and gravel.

The upland loessal soil (Figure 2.8) is generally thinner than the floodplain soil, being usually less than 12 m (39 ft) thick, and was deposited during the age of Pleistocene glaciation. The loess consists of silt-sized particles that were transported by wind and deposited as a blanket over much of Missouri and Illinois. On the hills near the West Lake Landfill, the loess layer may be as much as 24 m (79 ft) thick. It consists of 6 to 9 m (20 to 30 ft) of fairly pure silt (Peoria loess) overlying 6 to 15 m (20 to 49 ft) of clay silt (Roxana loess) (Lutzen and Rockaway, 1971). This loess forms the hills to the southeast of the landfill, but it has long ago been removed from the landfill site and most of the surrounding valleys by erosion. The upper 1 m (3 ft) of the loess has been altered to form a thin soil profile. It should be noted that loess has a vertical permeability which is far greater than its horizontal permeability (Freeze and Cherry, 1979). The total permeability of loess is greatly increased by disturbance. The individual silt grains are generally quite angular, and therefore may not be effectively compacted by the methods commonly used to consolidate clay. The technique most effective in the compaction of loess would employ vibration beneath a surcharge. A relict soil profile from 5 to 10 m (16 to 33 ft) thick lies beneath the loess and directly on top of the bedrock. This soil was formed as a residuum before Pleistocene glaciation and was subsequently covered by the loess blanket. This soil is a highly consolidated clay containing abundant chert fragments (Lutzen and Rockaway, 1971). In addition to the natural geologic properties of the landfill, human disturbance of the soil must also be considered since material within the landfill itself can either limit or facilitate migration of leachate to the Missouri River alluvial aquifer.

In order to prevent downward movement of leachate, it is now a common practice to place a layer of compacted clay beneath sanitary landfills. Newer portions

of the landfill (constructed since 1974) have 2 to 3 m (7 to 10 ft) of clay at the base and around the sides. Waste is covered every day with 15 cm (6 in.) of compacted soil; the cover soil presently used is loess (of soil classifications CL and A4) taken from southeast of the landfill (Reitz and Jens, 1983a). If not properly compacted, this material may have a permeability of 0.0001 cm/sec (0.00004 in./sec) or more. It is not known what procedures for compaction, if any, were used at the landfill before 1974 since the site was unregulated in design as well as in materials which were accepted for disposal. It is believed, however, that there is no liner present beneath the northwestern portion of the landfill, and that sanitary (and, possibly, some hazardous) material was placed directly on the original ground surface. Since waste was periodically covered with soil to minimize rodent and odor problems, the landfill probably consists of discrete layers of waste separated by thin soil layers. Both areas containing radioactive material are in these presumably unlined above-ground portions of the landfill.

2.8 Hydrology

2.8.1 Subsurface Hydrology

Groundwater flow in the area surrounding the West Lake site is through two aquifers: the Missouri River alluvium and the shallow limestone bedrock. The base of the limestone aquifer is formed by the relatively impermeable Warsaw shale at an elevation of about 58 m (190 ft) msl (Figure 2.4). This shale layer has been reached, but not disturbed, by quarrying operations. Therefore, the Warsaw shale acts as an aquiclude, making contamination of the deeper limestone very unlikely. The Mississippian limestone beds have very low intergranular permeability in an undisturbed state (Miller, 1977). However, a strong leachate enters the quarry pit at an elevation of about 67 m (220 ft) msl (pt. A on Figure 2.5). This leachate is migrating vertically through more than 30 m (98 ft) of limestone. Explosive detonations associated with quarrying operations will tend to cause fractures to propagate in the quarry wall. These fractures have probably extended less than 10 m (33 ft) into the rock from the quarry face. Beyond this, the rock probably remains undisturbed. These fractures will tend to increase inflow to the quarry pit and allow leachate to percolate downward through the fractured zone. Thus, leachate inflow to the

quarry pit is not evidence of large-scale contamination of the limestone aquifer. The only other mechanism by which leachate could travel rapidly through the limestone is by transport through solution channels. Landfill consultants and quarry operators maintain that the limestone is fairly intact (Canney, personal communication, September 1983), and superficial observation of the quarry walls seems to support this conclusion. Since the limestone is fairly impervious and groundwater flows in most areas from the bedrock into the alluvium, contamination of water in the bedrock aquifer does not appear likely.

The water table of the Missouri River floodplain is generally within 3 m (10 ft) of the ground surface, but at many points it is even shallower. At any one time, the water levels and flow directions are influenced by both the river stage and the amount of water entering the floodplain from adjacent upland areas. A high river stage tends to shift the groundwater gradient to the north, in a direction that more closely parallels the Missouri River. Local rainfall will shift the groundwater gradient to the west, toward the river and along the fall of the ground surface. This is inferred from water levels measured in monitoring wells at the West Lake site. The fact that groundwater levels commonly fluctuate more than does the Missouri River level, indicates that upland-derived recharge exerts a great deal of influence over groundwater flow at the West Lake site. This influence decreases toward the river.

The deep Missouri River alluvium acts as a single aquifer of very high permeability. This aquifer is relatively homogeneous in a downstream direction, and decreases in permeability near the valley walls. The deeper alluvium is covered by 2 to 4 m (7 to 13 ft) of organic silts and clays that may locally contain a large fraction of sand-sized particles. Water levels recorded between November 1983 and March 1984 in monitoring wells at West Lake* indicate a groundwater gradient of 0.005 flowing in a N 30°W direction beneath the northern portion of the landfill. This represents the likely direction of any possible leachate migration from the landfill (Figure 2.5).

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*Data supplied by Reitz and Jens engineering firm, St.Louis, 1984.

The alluvial aquifer recharges from upland areas from three sources: seepage from loess and bedrock bordering the valley, channel underflow of upland streams entering the valley, and seepage losses from streams as they cross the floodplain. Of these sources, streams and their underflow represent the main source of upland recharge to the alluvial aquifer. Streams entering the floodplain raise the water table in a fan-shaped pattern radiating outward from their point of entrance to the plain. In areas where streams are not present, the water slopes downward from the hills, steeply at first and then gently to the level of the free water surface in the Missouri River channel. The situations described above do not take into account the effect of variations in permeability of the shallow soil layer. Aerial photography of the site indicates that a filled backchannel (oxbow lake) type of soil deposit is present along the southwest boundary of the landfill (USDA, 1953). This deposit is probably composed of fine-grained material to the depth of the former channel (6 to 10 m) (20 to 33 ft). This deposit may tend to hamper communication between shallow groundwater on opposite sides of the deposit.

Since no other recharge sources exist above the level of the floodplain, the only water available to leach the landfill debris is that resulting from rainfall infiltrating the landfill surface. Because the underlying alluvial aquifer is highly permeable, there will be little "mounding" of water beneath the landfill. Because the northern portion of the landfill has a level surface it is likely that at least half of the rainfall infiltrates the surface. The remaining rainfall is lost to evapotranspiration and (to a lesser degree) surface runoff. Due to the height of the berm, temporary impoundment of surface runoff is a common occurrence.

No public water supplies are drawn from the alluvial aquifer near the West Lake Landfill. It is believed that only one private well (Figure 2.9) in the vicinity of the landfill is used as a drinking water supply. This well is 2.2 km (1.4 miles) N 35°W of the former Butler-type building location on the West Lake Landfill. In 1981, analysis showed water in this well to be fairly hard (natural origins) but otherwise of good quality (Long, 1981).

Water in the Missouri River alluvium is hard and usually contains a high concentration of iron and manganese (Miller, 1977). The amount of dissolved

solids present in the water of the alluvial aquifer varies greatly; purity increases toward mid-valley where groundwater velocity is greatest. A water sample from a well in the alluvium 3 km (1.9 miles) north of the landfill had a total dissolved solids content of 510 mg/liter and total hardness as $CaCO_3$ of 415 mg/liter. Water in the limestone bedrock generally has a hardness greater than 180 mg/liter as $CaCO_3$ equivalent (Emmett and Jeffery, 1968). Total dissolved solids range from 311 to 970 mg/liter. Water in the limestone aquifer may contain a large amount of sulfate of natural origin (Miller, 1977).

2.8.2 Surface Hydrology

Because of the extremely low slope of the Missouri River flood plain surface, precipitation falling on the plain itself generally infiltrates the soil rather than running off the surface. The only streams present on the floodplain are those that originate in upland areas. Drainage patterns on the plain (Figure 2.9) have been radically altered by flood control measures taken to protect Earth City (Figure 2.1) and by drainage of swamps and marshes. Before these alterations, Creve Coeur Creek passed just south of the landfill, and drained a fairly large area. It has since been redirected to discharge into the Missouri River upstream (south) of St. Charles (Figure 2.9). The old channel still carries some water, and empties into the Missouri River 45.2 km (28 miles) upstream from the confluence with the Mississippi River. Near the landfill, this stream is usually dry. As it crosses the flood plain, the creek passes through shallow lakes which provide a more or less continuous flow to the Missouri River throughout the year. A second stream, Cowmire Creek, crosses the floodplain east of the site. This stream flows northward and joins a backwater portion of the Missouri River at kilometer 35.4 (22 miles). Because of the relationship which exists between river level and groundwater level in portions of the floodplain near the river, these streams may either lose flow (at low stage) or gain flow (at high stage).

The present channel of the Missouri River lies about 3 km (2 miles) west and northwest of the landfill. Early land surveys of this area indicate that 200 years ago the channel was located several hundred meters to the east (toward the landfill) of its present course (Reitz and Jens, 1983b). The Missouri River has a surface slope of about 0.00018 (Long, 1981). River stage at St. Charles

[kilometer 45.2 (mile 28)] is zero for a water level of 126.1 m (413.7 ft) msl (Reitz and Jens, 1983a). Average discharge of the Missouri River is 2190 m^3/s (77,300 ft^3/s), with a maximum flow of 2850 m^3/s (101,000 ft^3/s) for the period of April through July, and a minimum flow of 1140 m^3/s (40,300 ft^3/s) in January and December (Mill[illegible] 1977). Some average properties of Missouri River water for the period 1951-1970 were: alkalinity = 150 mg/[illegible] as $CaCO_3$ equivalent; hardness = 209 mg/liter as $CaCO_3$ equivalent; pH = 8.1; and turbidity = 694 JTU (Jackson turbidity unit).

Water supplies are drawn from the Missouri River at kilometer [illegible] (mile 29) for the city of St. Charles, and the intake is located on the north bank of the river. Another intake at kilometer 33 (mile 20.5) is for the St. Louis Water Company's North County plant (Reitz and Jens, 1983a).

The city of St. Louis takes water from the Mississippi River, which joins the Missouri River downstream from the landfill. In this segment of the river, the two flow-streams have not completely mixed and the water derived from the Missouri River is still flowing as a stream along the west bank of the Mississippi River channel*. The intake structures for St. Louis are on the east bank of the river so that the water drawn is derived from the upper Mississippi.

2.9 Meteorology

The climate of the West Lake area is typical of the midwestern United States, in that there are four distinct seasons. Winters are generally not too severe and summers are hot with high humidity. First frosts usually occur in October; and freezing temperatures generally do not persist past March. Rainfall is greatest in the warmer months, (about one-quarter of the annual precipitation occurs in May and June) (Figure 2.10) (NRC, 1981). In July and August, thunderstorms are common, and are often accompanied by short periods of heavy rainfall. Average annual precipitation is 897 mm (35.3 in.), which includes the average annual snowfall of 437 mm (17.2 inches snow). Average relative humidity is 68%,

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*Ned Harvey, hydrologist with the USGS, telephone communication, August 1983.

and humidities over 80% are common during the summer. Wind during the period of December through April is generally from the northwest; winds blow mainly from the south throughout the remainder of the year. A compilation of hourly wind observations shows that although the wind resultant is fairly consistent on a monthly basis, the wind actually shifts a good deal and is very well distributed in all directions (Figure 2.11) (NRC, 1981; U.S. Department of Commerce, 1960).

Meteorological data used is from Lambert Field International Airport which is 6 km (3.7 miles) east of the West Lake site. Temperature and precipitation data are also representative of West Lake. However, because of differences in topography between Lambert Field and the site, the actual wind directions at West Lake may be slightly skewed in a NE-SW direction parallel to the Missouri River valley.

2.10 Ecology

The West Lake Landfill is biologically and ecologically diverse. Rather than a single ecological system (e.g., a prairie), it is a mosaic of small habitats associated with

(1) moist bottomland and farmland adjacent to the perimeter berm

(2) poor quality drier soils on the upper exterior and interior slopes of the berm

(3) an irregular waste ground surface associated with the inactive portion of the landfill

(4) aquatic ecosystems present in low spots on the waste ground surface

Generally, the natural systems which are present are limited by operations in the active portion of the landfill and form a corridor along the perimeter berm from near well site 75 (Figure 2.5), on the Old St. Charles Rock Road, clockwise to the main entrance to the landfill near well site 68, along St. Charles Rock

Road. The following observation and descriptions demonstrate the biological variety of these sites.

The flora of the perimeter berm extending from the southwest clockwise to the area of the main entrance to the landfill present a series of contrasts. Along the Old St. Charles Rock Road, the bottom and lower slope of the berm is heavily influenced by the nearby mature silver maple (Acer saccharinum), boxelder (Acer negundo), oak (Quercus), sycamore (Platanus), green ash (Fraximus pennsylvanica), and eastern cottonwood (Populus deltoides) trees associated with the old channel of Creve Coeur Creek. At the corner, between wells 59 and 60 (Figure 2.5), large silver maple and boxelder trees form a dense stand in the moist soils at the base of the berm. The density of these trees declines on this slope extending toward the north (well 61) and the Butler-type Building corner. The extension of this slope toward the northwest is dominated by a dense willow-like thicket in which a few eastern cottonwoods and a hawthorn tree have established. From this northwest corner of the landfill to the eastern limit of the trees between the landfill and St. Charles Rock Road (well 65), the exterior slope of the berm is dominated by dense stands of small and large eastern cottonwoods. This latter occurrence reflects the influence of the well-established eastern cottonwoods and sycamores associated with the permanent pond just north of this site (Figure 2.9). The ground cover along these exterior slopes consists of grasses, forbs, plants common to disturbed areas, seedling cottonwoods, and shrubs. A well-manicured grass groundcover continues from the limit of the trees to the area around the main entrance of the landfill and well 68. This vegetation contributes to the partial stabilization of the steep exterior slopes.

The somewhat drier top and the short, interior slope of the berm, colonized by prairie grasses such as bluestem (Andropogon), blends into the irregular surface of the inactive portion of the landfill. Depressions in this surface allow water to collect and tall grasses, foxtail, and plants characteristic of disturbed areas [e.g., ragweed (Ambrosia), mullein (Verbascum), pokeweed (Phytolacca), cinquefoil (Potentilla), sunflower (Helianthus), and plantain (Plantago)] are replaced by characteristic wetland species [e.g., algae (Spirogyra), cattails (Typha), sedges (Carex), and smartweed (Polygonium)]. Young eastern cottonwoods are established at several of the wet sites.

Generally, the surface vegetation of the inactive landfill gives way to barren waste ground around the Butler-type Building location and the barren terrain associated with recent landfill activities.

Animals were observed associated with these habitats. Cottontail rabbits (Sylvilagus) were encountered most frequently and their fecal pellets were observed on the landfill. Density of fecal material was particularly heavy in the thickets on the exterior slopes of the perimeter berm. In this regard, coyote (Canis latrans) feces containing rabbit fur were observed. Small mammals (rodents) were not seen but could certainly be present in these areas. Large ungulates also were not sighted, but tracks and feces of white-tailed deer indicate that they utilize the landfill.

The only birds observed were a crow (Corvus), several robins (Turdus), and white-crowned sparrows (Zonotrichia leucophrys). This certainly does not reflect the extent to which birds utilize these habitats, for observations were made early in the spring. It is readily apparent that returning migratory passerines would utilize the surface vegetation and berm thickets for nesting, cover, and feed later in the season. It is also possible that waterfowl could utilize the permanent ponds on the landfill and adjacent to St. Charles Rock Road. Twelve scaup (Aythya) and mallards (Anas) were observed on the lagoon which serves as part of the landfill waste water treatment facility.

Small puddles contained characteristic aquatic invertebrates and at least two species of amphibians. Casual examination of these shallow waters revealed three genera of snails (Physa, Lymnaea, Helisoma), an isopod (Asnellus), cyclopoid copepods, and cladocerans. Aquatic insect larvae were not observed; however, this does not rule out their presence. The sighting of a bullfrog tadpole (Rana catesbeiana) and audition of spring peepers (Hyla), indicates these ponds are utilized as breeding sites. No fish were observed in these puddles on the landfill surface; however, a dead gizzard shad (Dorsoma cepedianum) was seen in the pond adjacent to St. Charles Rock Road. The only reptiles seen were the water snake (Nerodia) and the garter snake (Thamnophis).

Although the northwest inactive portion of the landfill is posted with "No Trespassing" signs, it was evident that humans do encroach on these habitats.

Fishing tackle was found tangled in power lines and trees, and spent small-gauge shotgun shells were found on the landfill surface and berms.

2.11 Demographics

The West Lake Landfill is located in the northwestern portion of the city of Bridgeton, in St. Louis County, Missouri. Earth City Industrial Park is located on the floodplain 1.5 to 2 km (0.9 to 1.2 miles) northwest of the landfill. Population density on the floodplain is generally less than 10 persons per square kilometer (26 persons per square mile); and the daytime population (including factory workers) is much greater than the number of full-time residents.

Major highways in the area include Interstate 70 (I-70) and Interstate 270 (I-270), which meet south of the landfill at Natural Bridge Junction (Figure 1.1). The Earth City Expressway and St. Charles Rock Road lie, respectively, west and east of the landfill. The Norfolk and Western Railroad passes about 1 km (0.6 mile) from the northern portion of the landfill (Figure 1.1). Lambert Field International Airport is located 6 km (3.7 miles) east of the West Lake Landfill.

In addition to factories at Earth City, plants are operated by Ralston-Purina and Hussman Refrigeration across St. Charles Rock Road. The employees of these two plants probably comprise the largest group of individuals in close proximity to the contaminated areas for significant periods of time. The Ralston-Purina facilities are located 0.4 km (0.2 mile) northeast of the Butler-type Building location at the landfill. Considering that land in this area is relatively inexpensive and that much of it is zoned for manufacturing, industrial development on the floodplain will likely increase in the future.

Two small residential communities are present near the West Lake Landfill. Spanish Lake Village consists of about 90 homes and is located 1.5 km (0.9 mile) south of the landfill, and a small trailer court lies across St. Charles Rock Road, 1.5 km (0.9 mile) southeast of the site (Figure 2.1). Subdivisions are presently being developed 2 to 3 km (1.2 to 1.9 miles) east and southeast of the landfill in the hills above the floodplain. Ten or more houses lie east of the

landfill scattered along Taussig Road. The city of St. Charles is located north of the Missouri River at a distance greater than 3 km (1.9 miles) from the landfill.

Areas south of the West Lake Landfill are zoned residential; areas on the other sides are zoned for manufacturing and business (Figure 2.2). Most of the landfill is zoned for light manufacturing (M-1). However, approximately 0.3 km^2 (0.12 mi^2) of the northern portion of the landfill is zoned for residential use; this includes the contaminated area around the Butler-type Building site. The field northwest of the landfill between Old St. Charles Rock Road and St. Charles Rock Road is under cultivation. Trends indicate that the population of this area will increase, but the land will probably be used primarily for industrial facilities.

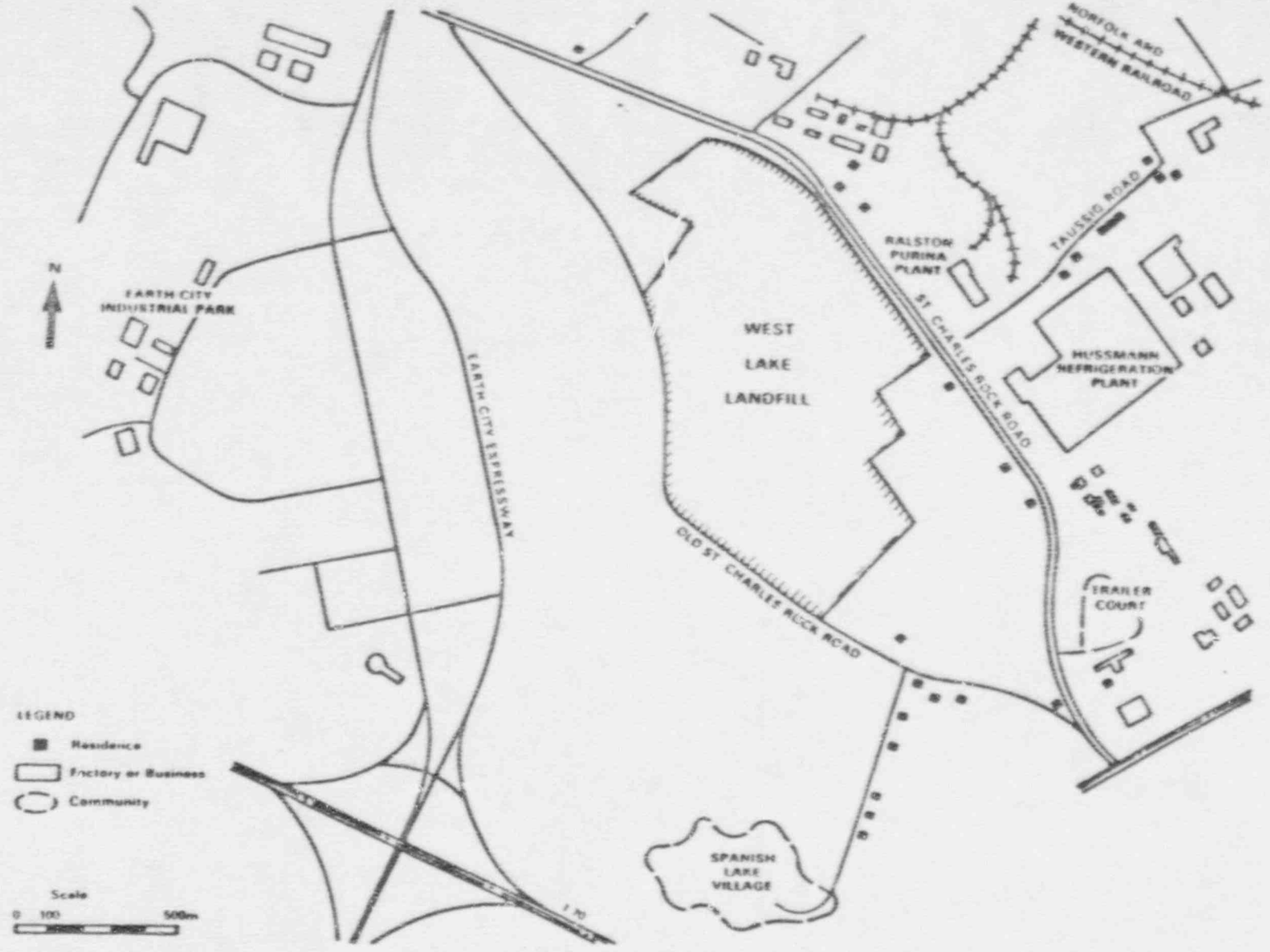


Figure 2.1 Land use around West Lake Landfill site

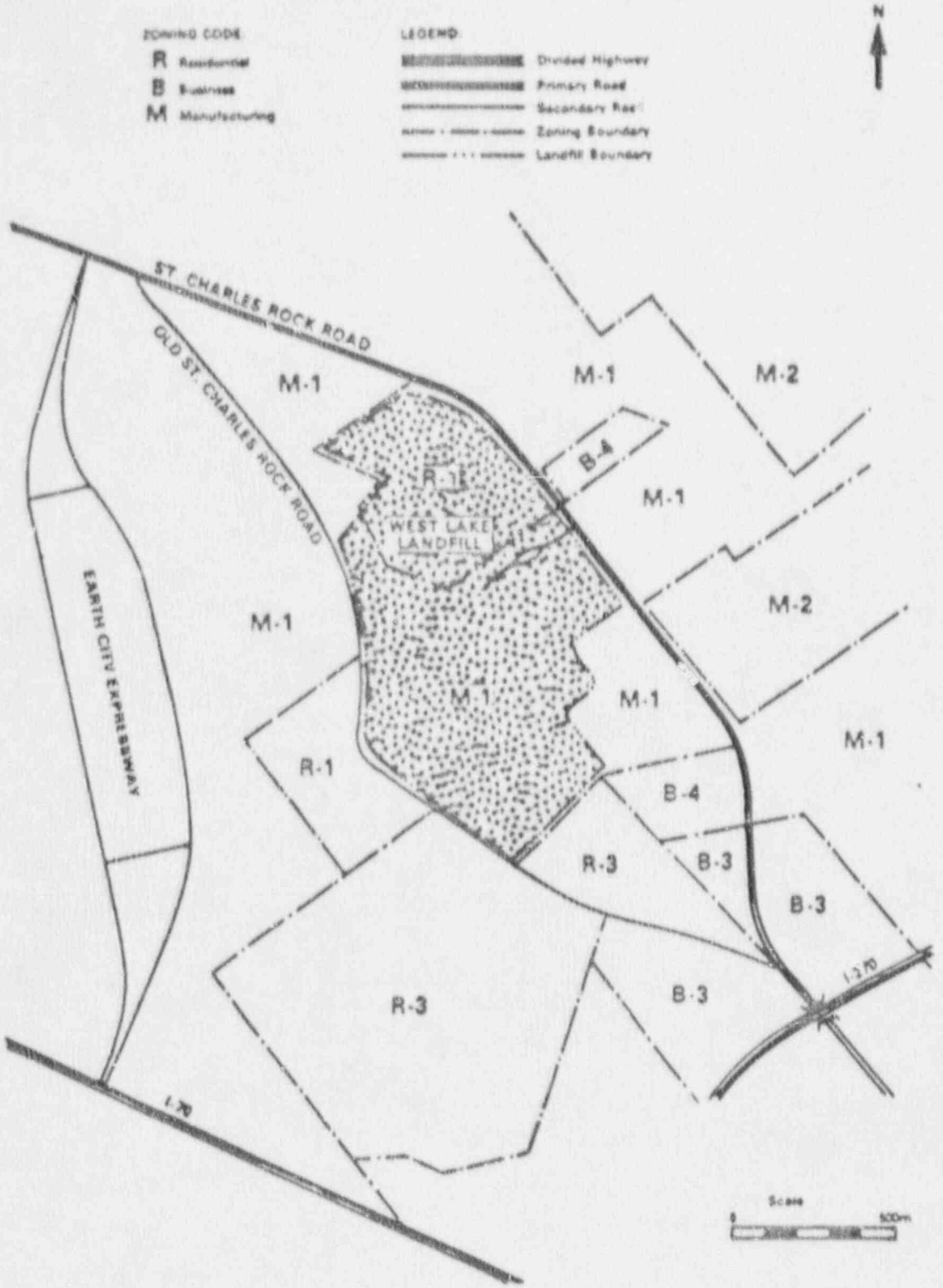


Figure 2.2 Zoning plan of West Lake area (June 1984)

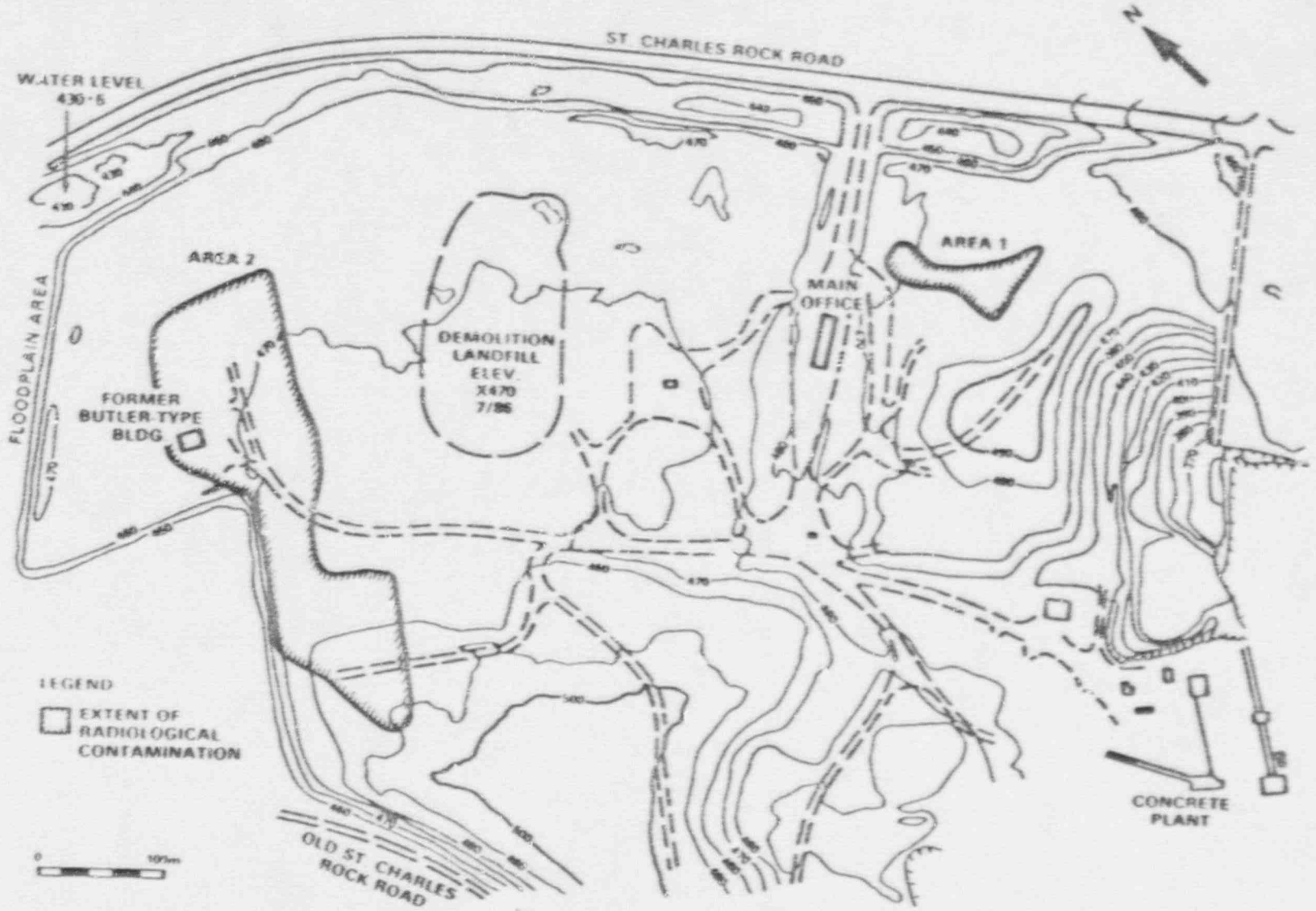


Figure 2.3 Site topography and extent of contamination.

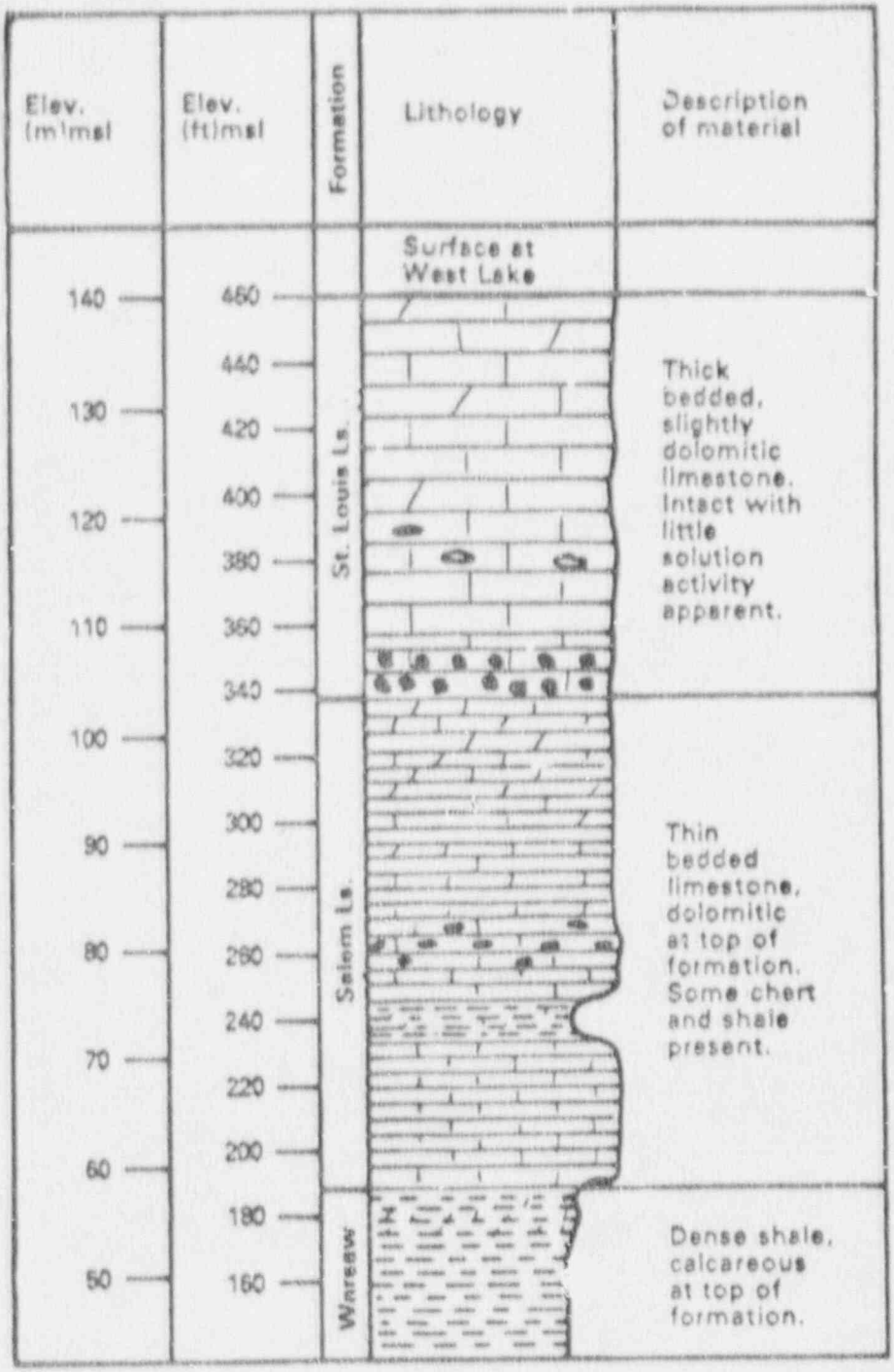


Figure 2.4 Bedrock stratigraphy

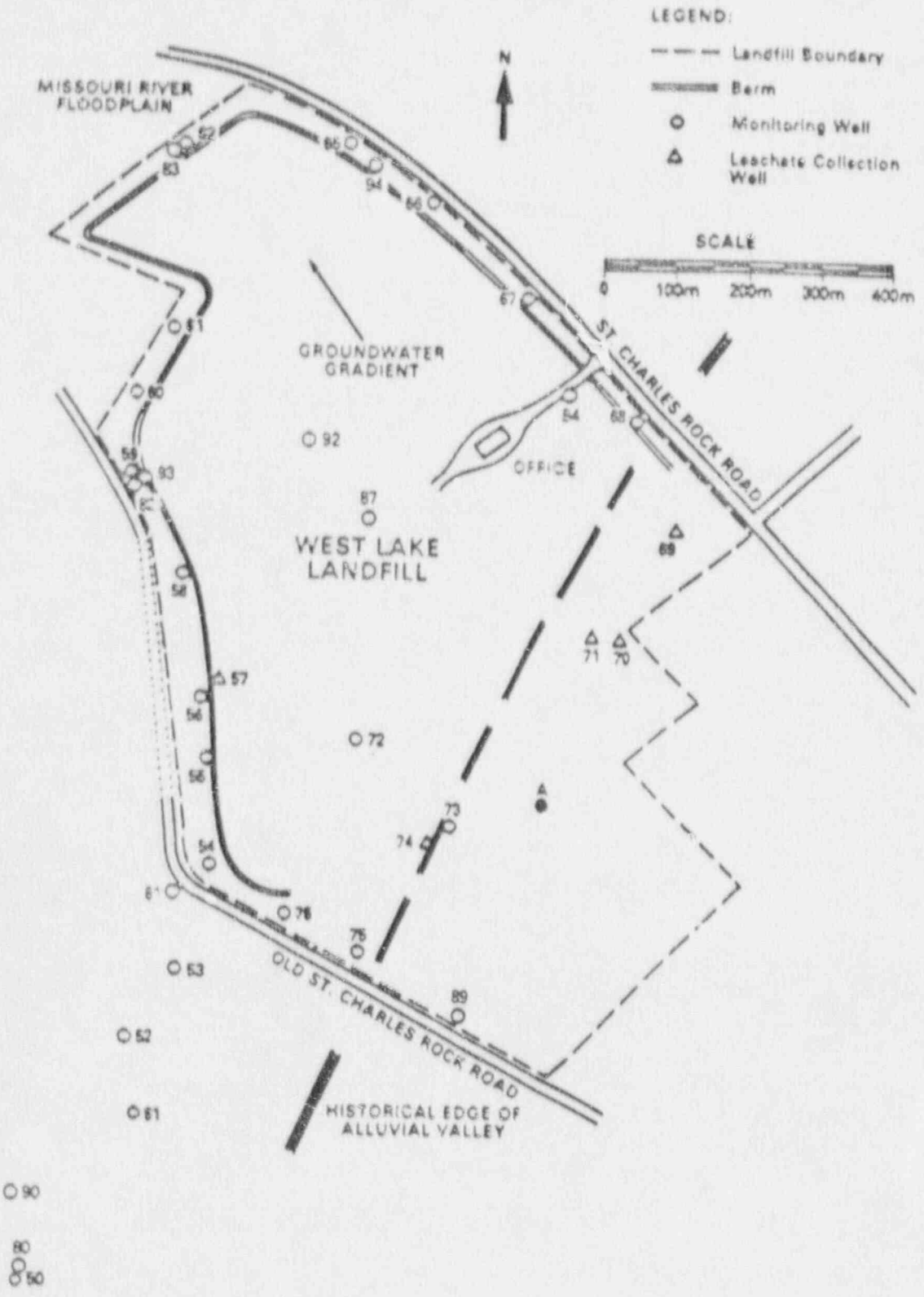


Figure 2.5 Location of monitoring wells

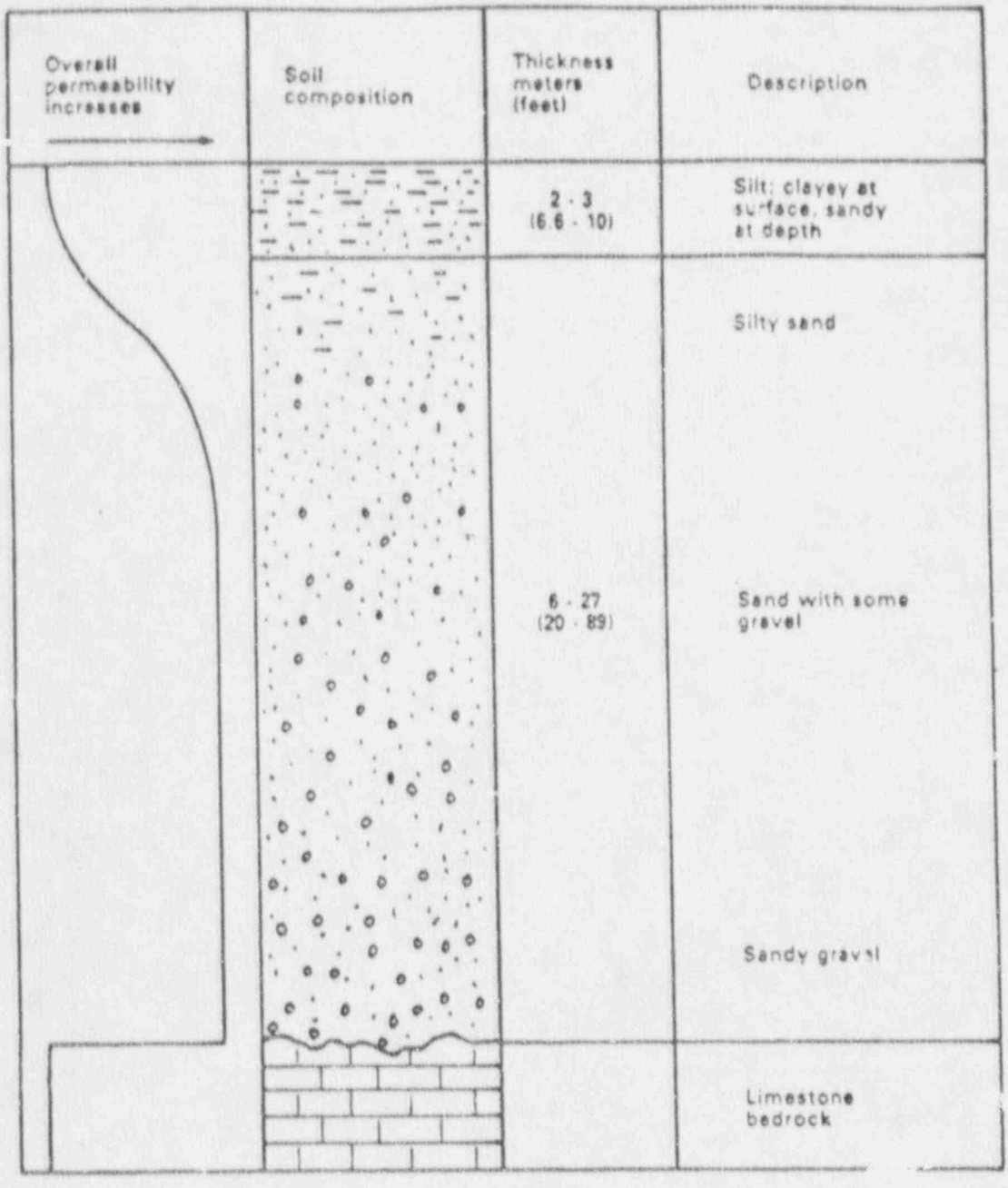


Figure 2.6 Soil profile of river alluvium

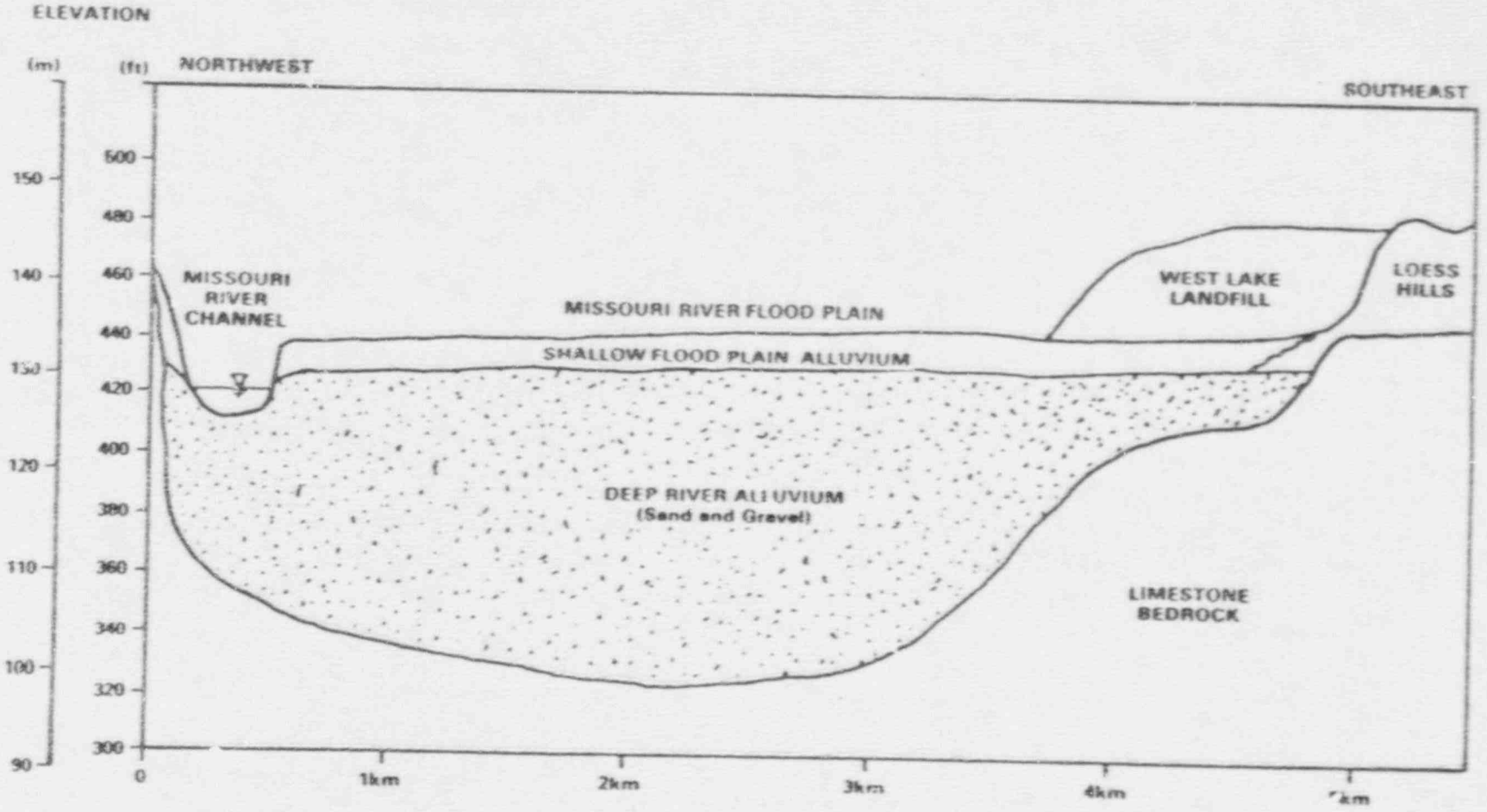


Figure 2.7 Cross-section of Missouri River alluvial valley

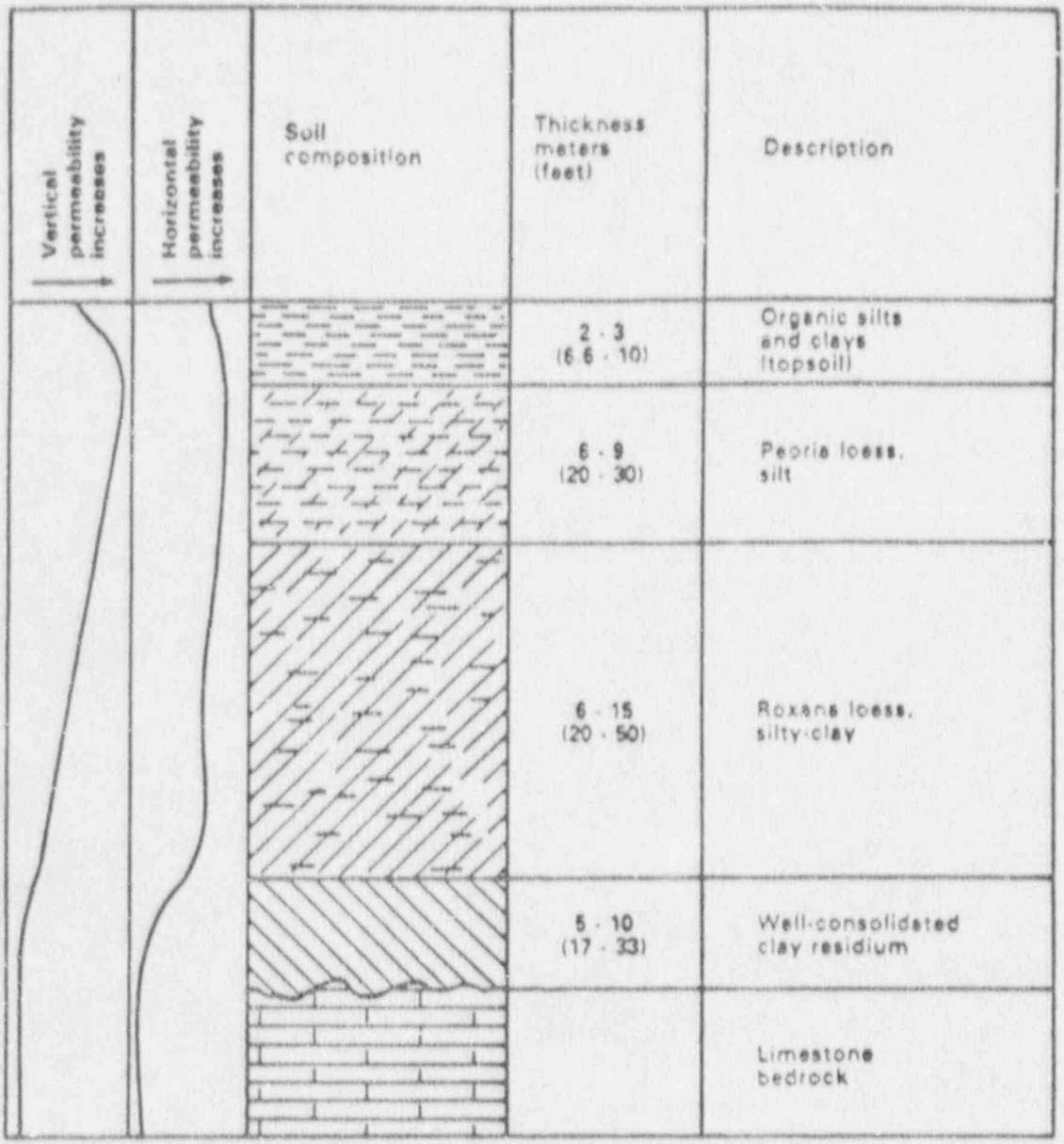


Figure 2.8 Soil profile of upland loessal soil

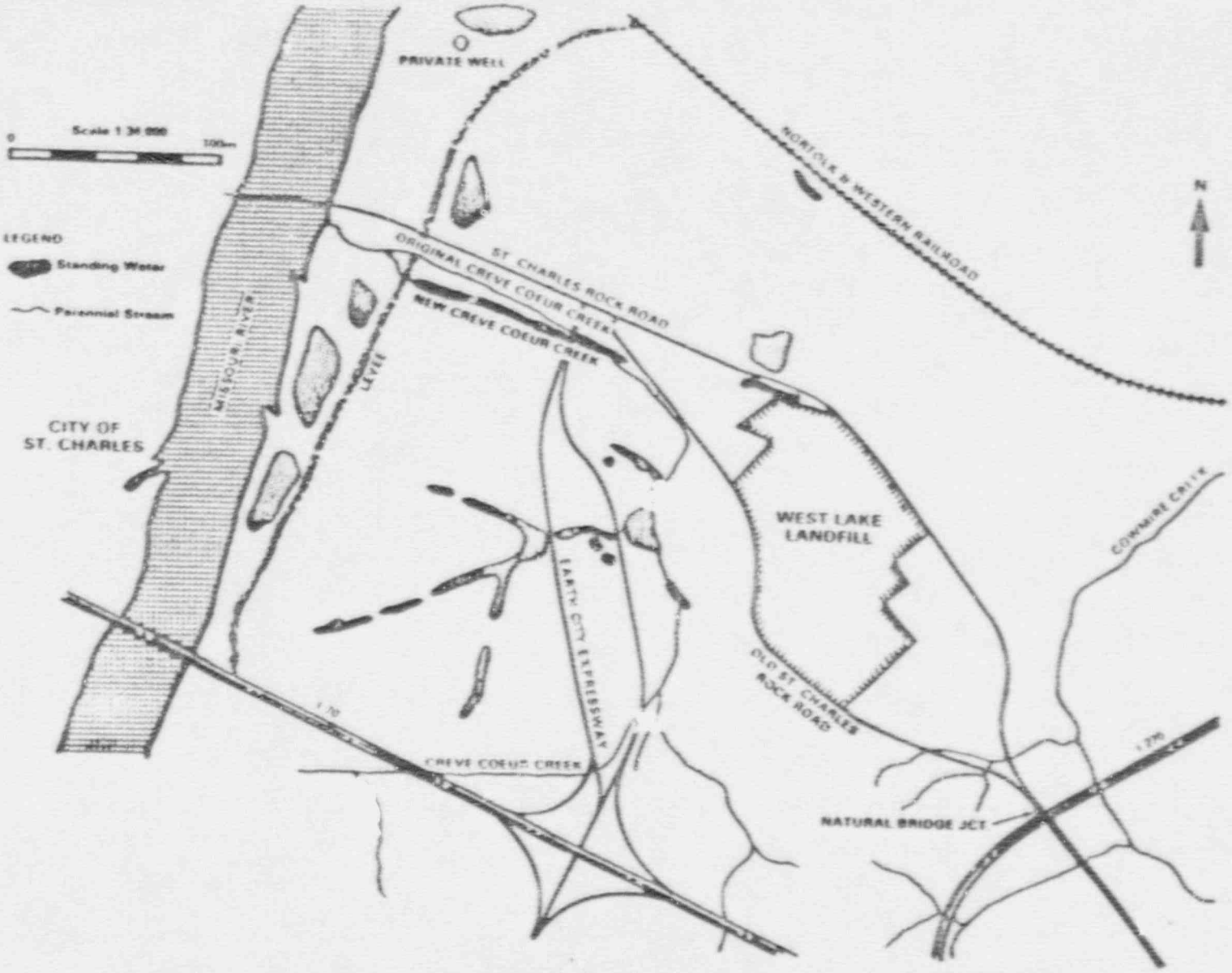


Figure 2.9 Surface hydrology of West Lake area

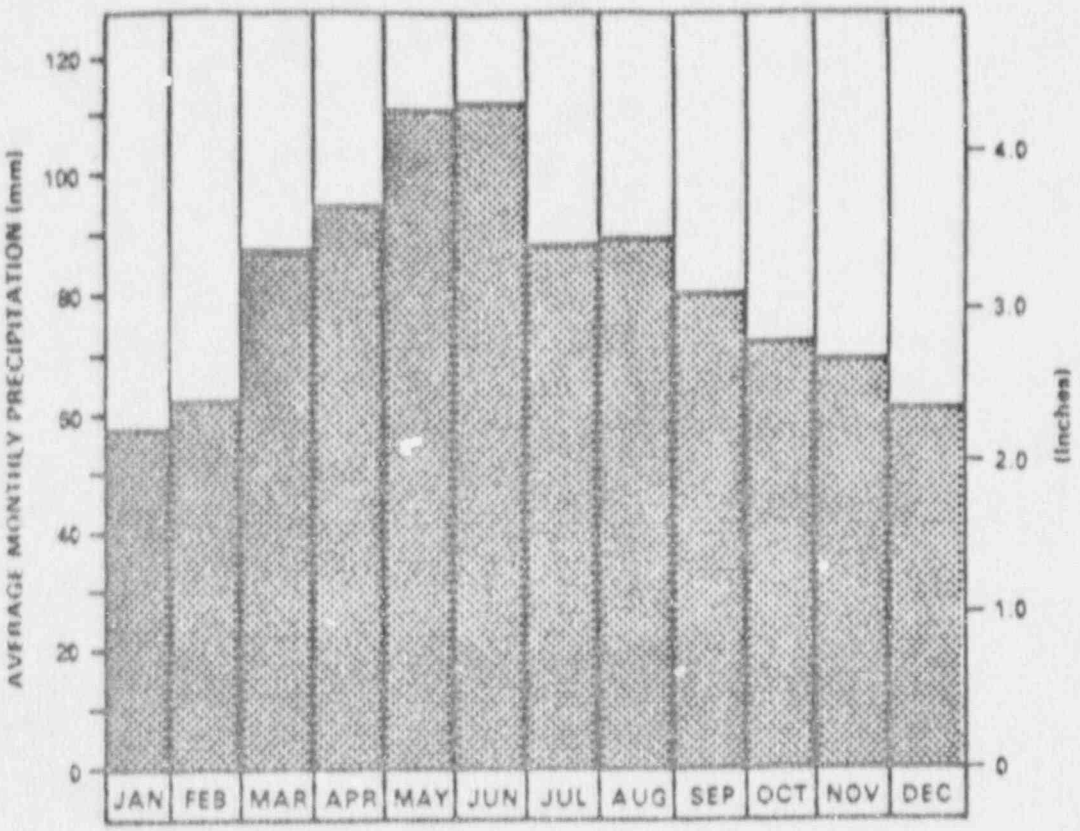
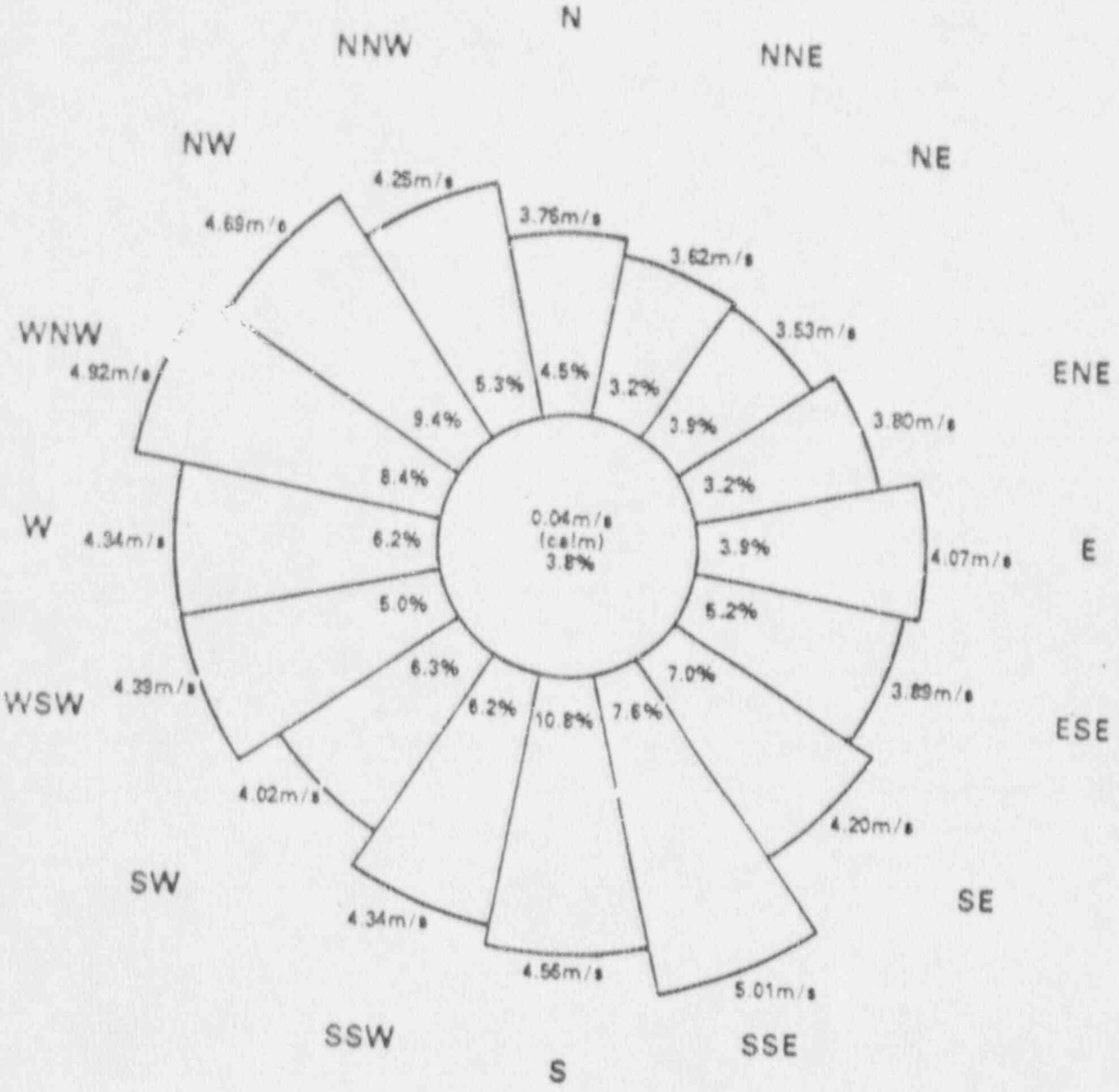


Figure 2.10 Average monthly precipitation at Lambert Field International Airport



Wind rose is for Lambert Field International Airport, Hazelwood, Missouri, and shows the percentage of hourly observations in each direction along with the average speed in that direction; for example, wind blew from the north 4.5% of the time at an average speed of 3.76 m/s.

Figure 2.11 Wind distribution for West Lake area

3 RADIOLOGICAL CHARACTERIZATION OF THE SITE

3.1 Radiological Surveillance

Approximately 43,000 mt (47,000 tons) of contaminated soil were reported to have been disposed of in the landfill. A fly-over radiological survey performed for the NRC in 1978 identified two areas of contamination at the West Lake Landfill.

Subsequently, from August 1980 through the summer of 1981, the Radiation Management Corporation (RMC), under contract to the NRC, performed an onsite evaluation of the West Lake Landfill (NRC, NUREG/CR-2722). The purpose of this survey was to clearly define the radiological conditions at the landfill. The results were to be utilized in performing an engineering evaluation to determine if remedial actions should and could be taken.

The area to be surveyed was divided into 10-m (33-ft) grid blocks and included the following measurements:

(1) external gamma exposure rates 1 m (3.3 ft) above the surfaces and beta-gamma count rates 1 cm (0.4 in.) above surfaces

(2) radionuclide concentrations in surface soils

(3) radionuclide concentrations in subsurface deposits

(4) gross activity and radionuclide concentrations in surface and subsurface water samples

(5) radon flux emanating from surfaces

(6) airborne radioactivity

(7) gross activity in vegetation

3.2 Survey Results

External Gamma

Figure 3.1 shows the two areas of elevated external radiation levels as they existed in November 1980, at the time of the preliminary RMC site survey. As can be seen, both areas contained locations where levels exceeded 100 μR/hr at 1 m (3.3 ft). In Area 2, gamma levels as high as 3000 to 4000 μR/hr were detected. The total areas exceeding 20 μR/hr were about 1.2 ha (3 acres) in Area 1 and 3.6 ha (9 acres) in Area 2.

External gamma levels measured in May and July of 1981 decreased significantly, especially in Area 1, because approximately 1.2 m (4 ft) of sanitary fill was added to the entire area and an equal amount of construction fill was added to most of Area 2. As a result, only a few hundred square meters (a few thousand square feet) in Area 1 exceed 20 μR/hr. In Area 2, the total area exceeding 20 μR/hr decreased by about 10%, and the highest levels were about 1600 μR/hr, near the location of the Butler-type building.

Surface Soil Analyses

A total of 61 surface soil samples were gathered and analyzed on site for gamma activity. Samples were normally stored 10 to 14 days to allow ingrowth of radium daughters. Concentrations of U-238, Ra-226 (from Pb-214 and Bi-214), Ra-223, Pb-211, and Pb-212 were determined for each sample. Surface soil samples are located in Figures 3.2 and 3.3.

In all soil samples, only uranium and/or thorium decay chain nuclides and K-40 were detected. Offsite background samples were on the order of 2 pCi/g Ra-226. Onsite samples ranged from about 1 to 21,000 pCi/g Ra-226, and from less than 10 to 2100 pCi/g U-238. In those cases where elevated levels of Ra-226 were detected, the concentrations of U-238 were generally anywhere from a factor of 2 to 10 lower. In cases of elevated sample activity, daughter products of both U-238 and U-235 were found.

In general, surface activity was limited to Area 2, as indicated by surface beta-gamma measuremenis. Only two small regions in Area 1 showed contamination; both were near the access road across from the site offices.

In addition to onsite gamma analyses, 12 samples were submitted to RMC's radiochemical laboratories for thorium and uranium radiochemical determinations. The results show all samples contain high levels of Th-230. The ratio of Th-230 to Ra-226 (Bi-214) is about 20 to 1.

Subsurface Soil Analysis

Subsurface contamination was assessed by extensively "logging" holes drilled through the landfill. Several holes were drilled in areas known to contain contamination, then additional holes were drilled at intervals in all directions until no further contamination was encountered. A total of 43 holes were drilled, 11 in Area 1 and, in Area 2, 32 including 2 nearby offsite wells for monitoring water. All holes were drilled with a 6-in. auger and lined with 4-in. PVC (polyvinyl chloride) casing. The location of these auger holes is shown in Figures 3.4 and 3.5.

Each hole was scanned with an NaI(Tl) detector and rate meter system for an initial indication of the location of subsurface contamination. On the basis of the initial scans, 19 holes were selected for detailed gamma logging using the intrinsic germanium (IG) detector and multiple channel analyzer.

The results of the NaI(Tl) counts and IG analyses show concentrations of Bi-214, as determined by the IG system, ranged from less than 1 to 19,000 pCi/g. For those holes where both NaI(Tl) counts and IG counts were made, a good correlation between gross NaI(Tl) counts and Ra-226 concentrations, as determined by in situ analysis of the daughter Bi-214 by the IG system, was found.

It was determined that the subsurface deposits extended beyond areas where surface radiation measurements exceeded 5 pCi/g. The approximate area of subsurface contamination compared to the area of elevated surface radiation levels shows a total difference in areas of 2 ha (5 acres).

The variations of contamination with depth for Areas 1 and 2 are shown in Figure 3.6. As can be seen, the surface elevations vary by about 6 m (20 ft), and the highest elevations occur at locations of fresh fill. Contamination (>5 pCi/g Ra-226) in several areas is found to extend from the surface to appreciable depths, about 6 m (20 ft) below the surface in two cases. In general, the subsurface contamination appears to be a continuous single layer, ranging from 0.6 to 4.6 m (2 to 15 ft) thick, located between elevations of 139 to 144 m (455 to 480 ft) and covering 6.5 ha (16 acres) total area.

In Figures 3.7 and 3.8, representations of the subsurface deposits are provided on the basis of auger hole measurements. These representations are consistent with the operating history of the site, which suggests that the contaminated material was moved onto the site and spread as cover over fill material. Thus, one would expect a fairly continuous, thin layer of contamination, as indicated by survey results.

Nonradiological Analysis

Six composite samples were submitted to RMC's Environmental Chemistry Laboratory for priority pollutant analysis. Five samples were taken from auger holes (one from Area 1 and four from Area 2) and the sixth from the West Lake leachate treatment plant sludge. The results indicate a significant presence of organic solvents in Area 2 samples. The results of the leachate sludge analysis were not as high as any of the soil samples.

A chemical analysis of radioactive material from both areas was also performed by RMC's laboratory. Results show elevated levels of barium and lead in most cases.

Background Radioactivity Measurement

Various offsite locations were selected for reference background measurements. The results of these measurements were within the normal range.

Airborne Radioactivity Analyses

Both gaseous and particulate airborne radioactivity were sampled and analyzed during this study. Since it was known that the buried material consisted partially or totally of uranium ore residues, the sampling program concentrated on measuring radon and its daughters in the air. Two methods were used: the first was a scintillation flask method for radon gas and the second was analysis of filter paper activity for particulate daughters.

A series of grab samples using the accumulator method were taken between May and August of 1981. A total of 111 samples from 32 locations was collected. Measurable radon flux levels ranged from 0.2 pCi/m^2s in low background areas to 865 pCi/m^2s in areas of surface contamination.

At three locations, repetitive measurements were made over a period of 2 months. These results are plotted in Figure 3.9. As can be seen, significant fluctuations were observed at two locations. The fact that these fluctuations were real and not measurement artifacts was later confirmed by duplicate charcoal canister samples, as described below.

A total of 35 charcoal canister samples was gathered at 19 locations over a 3-month period. The results show levels ranging from 0.3 pCi/m^2s to 613 pCi/m^2s. On 24 different occasions, the charcoal canisters and accumulator were placed in essentially the same locations, at the same time, for duplicate sampling. The results of this side-by-side study show generally good correlation between the two methods.

A set of 10-minute high-volume particulate air samples was taken to determine both short-lived radon daughter concentrations and long-lived gross alpha activity. The highest levels were detected in November 1980, near and inside the Butler-type building which has since been removed. These two samples approximately equal NRC's 10 CFR Part 20, Appendix B. alternate concentration limit of one-thirtieth WL for unrestricted areas.

In addition to the routine 10-minute samples, five 20-minute high-volume air samples were taken and counted immediately on the IG gamma spectroscopy system

to detect the presence of Rn-219 daughters. All samples were taken near surface contamination. In addition to Rn-222 daughter gamma activities, Rn-219 daughters were detected by measuring the low-abundance gamma rays of Pb-211. Concentrations of Rn-219 daughters ranged from 6×10^{-11} to 9×10^{-10} µCi/cc.

Vegetation Analysis

Vegetation samples included weed samples from onsite locations and farm crop samples (winter wheat) near the northeast boundary of the landfill. This location was chosen because runoff from the fill onto the farm field was possible. No elevated activities were found in these samples.

Water Analyses

A total of 37 water samples was taken: 4 in the fall of 1980, and the remainder in the spring and summer of 1981. One sample was equal to the U.S. Environmental Protection Agency (EPA) gross alpha activity standard for drinking water of 15 pCi/liter and that was a sample of standing water near the Butler-type building. Several samples, including all the leachate treatment plant samples, exceeded the EPA drinking water screening level for gross beta which would require isotopic analyses. Subsequent isotopic analyses indicated that the beta activity could be attributed to K-40. None of the offsite samples exceeded either EPA standard or screening level.

In 1981, MDNR collected 41 water samples which RMC analyzed for radioactivity (Table 3.1). Of these samples, 5 were background, 10 were onsite surface water, 10 were shallow groundwater standing in boreholes, and 16 were landfill leachate. From these data, background activity is estimated as 1.2 pCi/liter gross alpha and 27 pCi/liter gross beta. Results in Table 3.1 show the gross alpha in two water samples exceeded or equaled 15 pCi/l; the gross beta in ten water samples exceeded 50 pCi/l. Most of the gross beta activity comes from naturally occurring K-40 as determined from subsequent isotopic analysis.

In addition, groundwater samples in perimeter monitoring wells at the West Lake Landfill were taken by UMC personnel and ORAU in 1983, 1984, and 1986. The well locations are shown in Figure 2.5 and the results are presented in

Tables 3.2 and 3.3. Results in Table 3.2 show the gross alpha in two water sampl slightly exceeded 15 pCi/l; the gross beta were all below 50 pCi/l in all water samples. Table 3.3 shows analyses were below 15 pCi/l for gross alpha and 50 pCi for gross beta for all the wells.

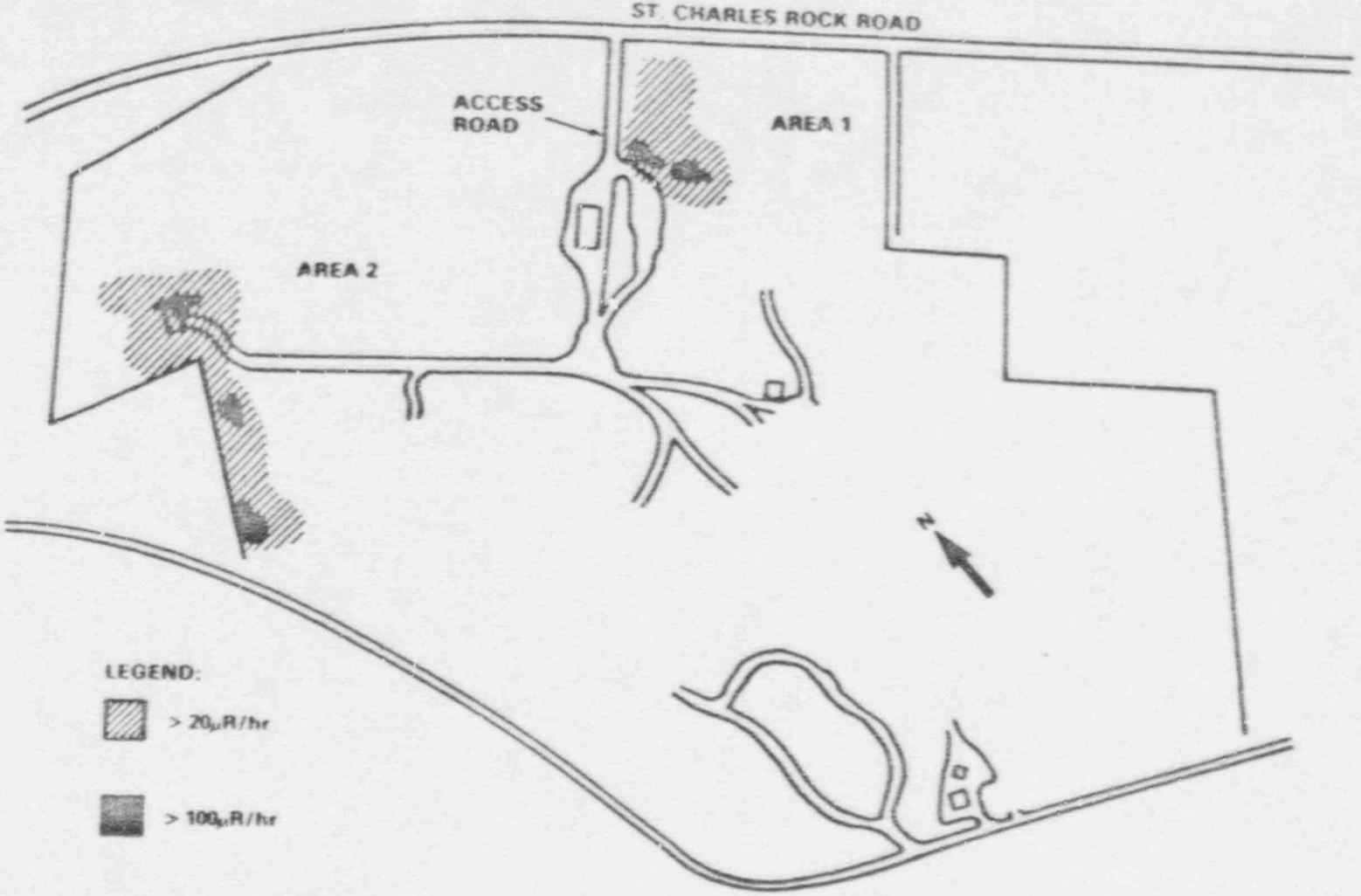
3.3 Estimation of Radioactivity Inventory

In examining the RMC report for bore hole samples (Table 3.3), it is noted that the naturally occurring U-238 to Th-230 to Ra-226 equilibrium has been disturbed. The RMC report (NRC, NUREG/CR-2722) indicates that the ratio of Ra-226 to U-238 is on the order of 2:1 to 10:1. This observation is consistent with the history of the radionuclide deposits in the West Lake Landfill, i.e., that they came from the processing of uranium ores to extract the uranium content and that the radioactive material at West Lake came from the former Cotter Corporation facility on Latty Avenue (presently occupied by Futura Coatings Company) in Hazelwood, Missouri. This location contains contamination from ore processing residues from which uranium had been previously separated, leaving the daughters behind at relatively higher concentrations. Additionally, it is noted in the RMC report that the ratio of Th-230 to Ra-226 is on the order of 5:1 to 50:1. This indicates that radium has also been removed. Other data are available in the Latty Avenue site study (Cole, 1981). Table 3.4 presents the radionuclide concentrations in Latty Avenue composite samples.

Using the RMC data and averaging the auger hole measurements over the two volumes of radioactive material found in Areas 1 and 2, a mean concentration of 90 pCi/g was calculated for Ra-226. Also, the ratios of Th-230 to Ra-226 were established since the level of Th-230 will determine the increase of Ra-226 with time. Although the ratio of Th-230 to Ra-226 ranged from 5:1 to 150:1, most of the data were in the 30:1 to 50:1 range. To ensure conservatism in estimating the long-term effects of Ra-226, a ratio of 100:1 was used for all further calculations.

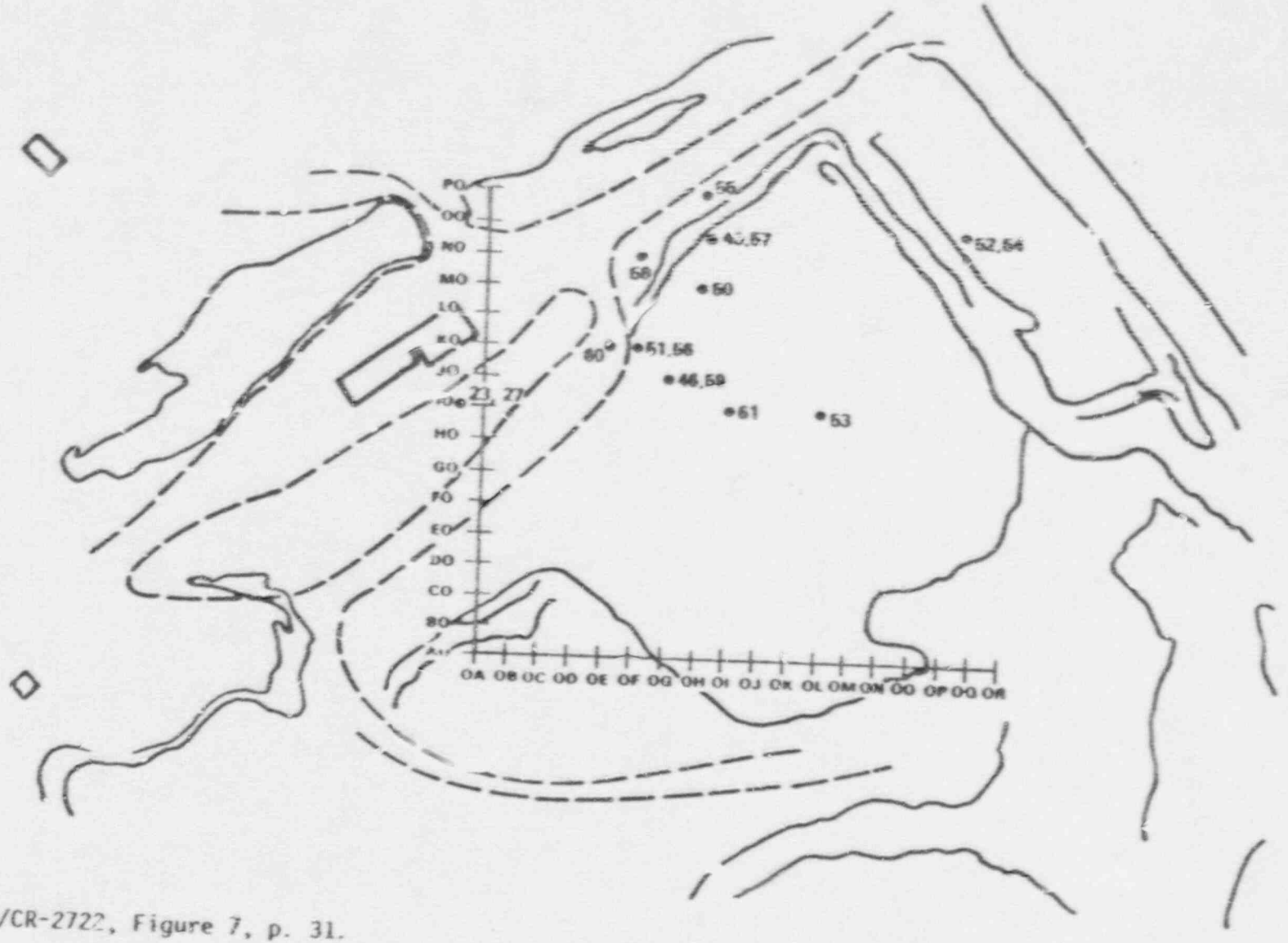
Using the Th-230:Ra-226 ratio of 100:1, the Th-230 activity is 9000 pCi per gram. If the U-238 concentration (as well as U-234 which would be similarly separated from the ore) is a factor of 5 less than Ra-226, this implies about 18 pCi U-238 per gram. The total mass of radioactive material (having Ra-226

concentrations of 5 pCi/g or more) in the landfill was estimated by visually integrating the volume of radioactive material from graphs and multiplying by an average soil density, resulting in 1.5×10^{11} grams (150,000 metric tons) of contaminated soil. These numbers indicate that there are about 14 Ci of Ra-226 contained with its decay products in the radioactive material in the landfill. The material also contains about 3 Ci each of U-238 and U-234, and about 1400 Ci of Th-230. These estimates indicate the order of magnitude of the quantities to be dealt with, although the estimate for Th-230 is regarded as conservatively large.



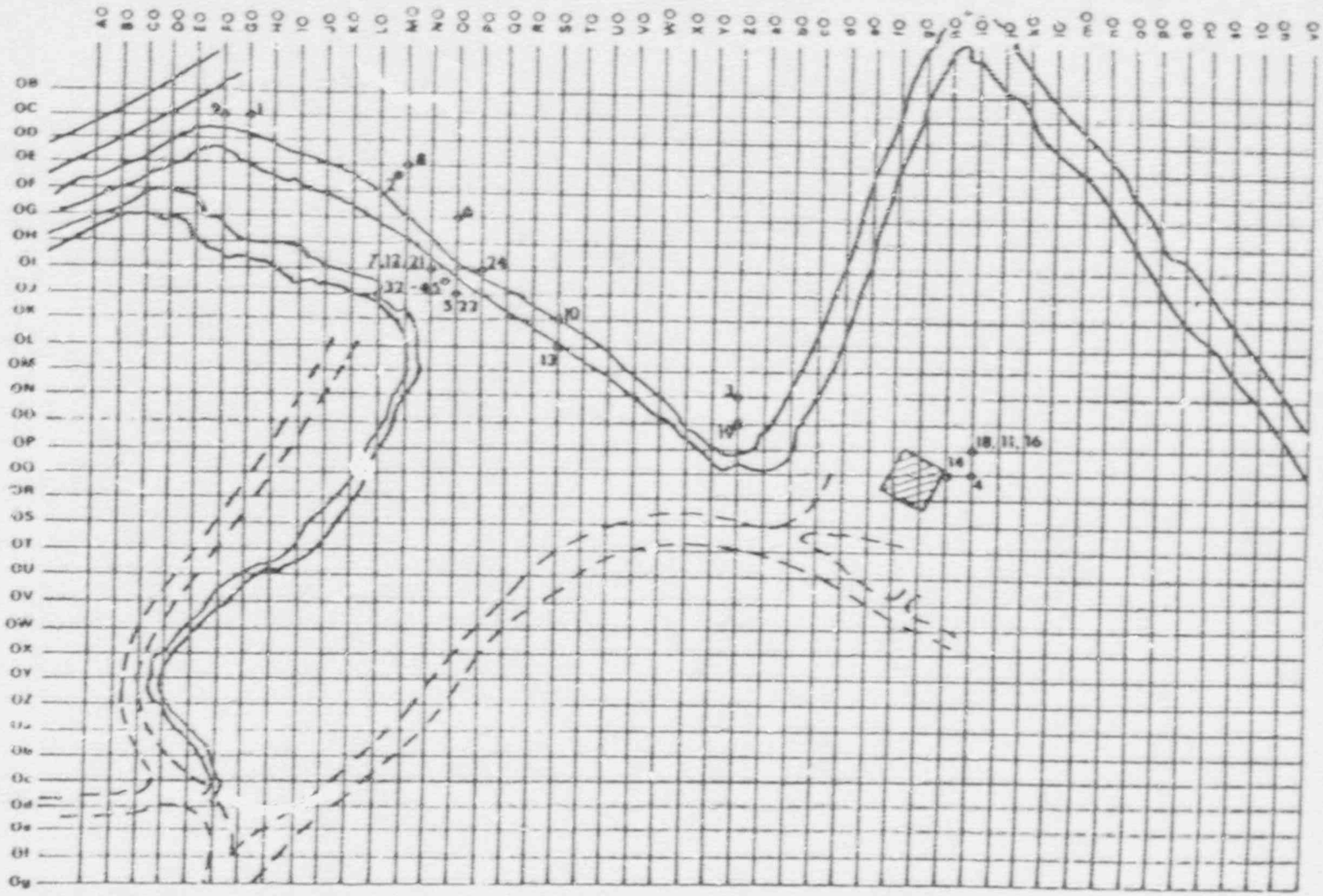
Source: NUREG/CR-2722, Figure 3, p. 27.

Figure 3.1 External gamma radiation levels (November 1980)



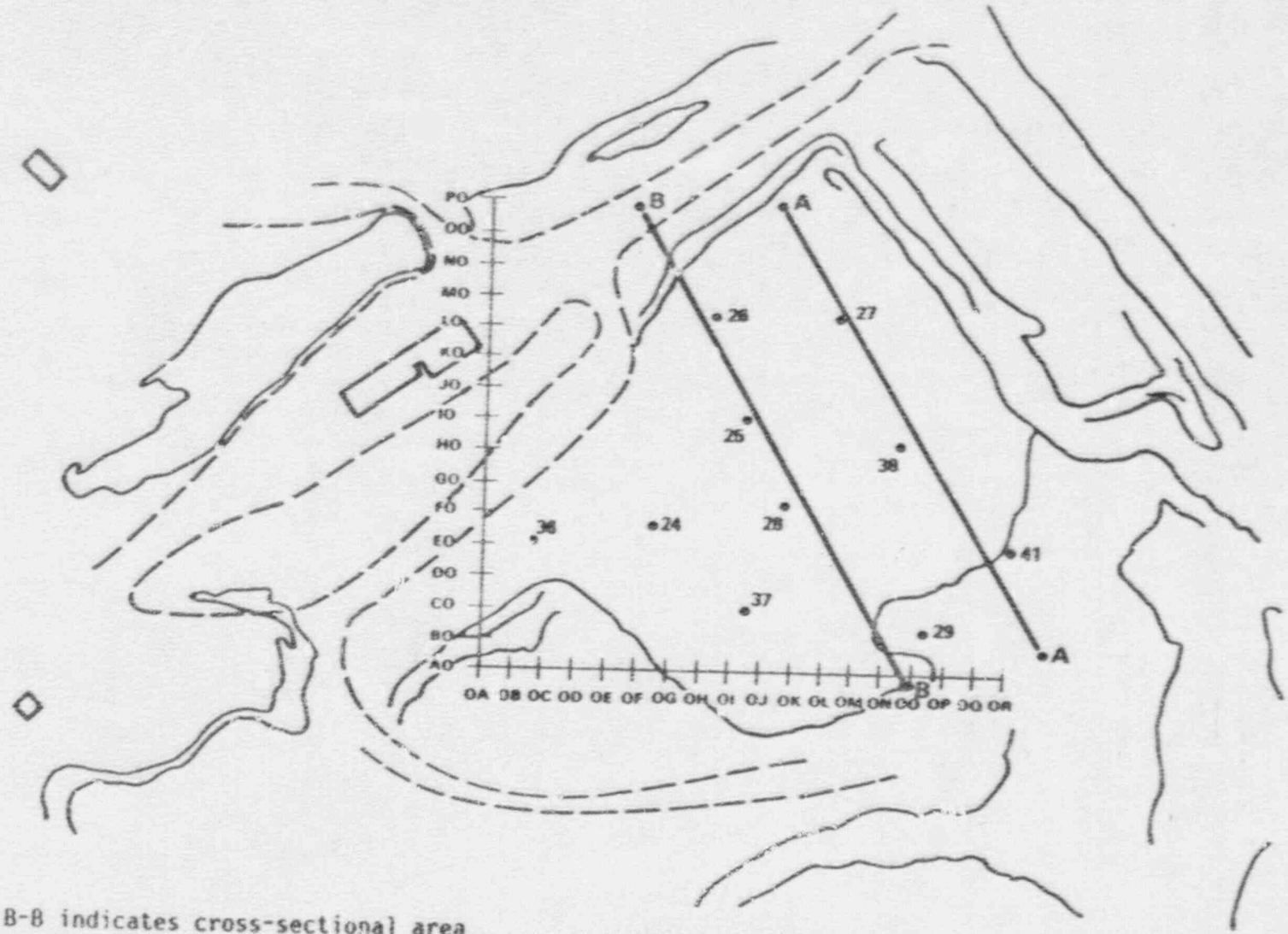
Source: NUREG/CR-2722, Figure 7, p. 31.

Figure 3.2 Location of surface soil samples, Area 1



Source: NUREG/CR-2722, Figure 8, p. 32.

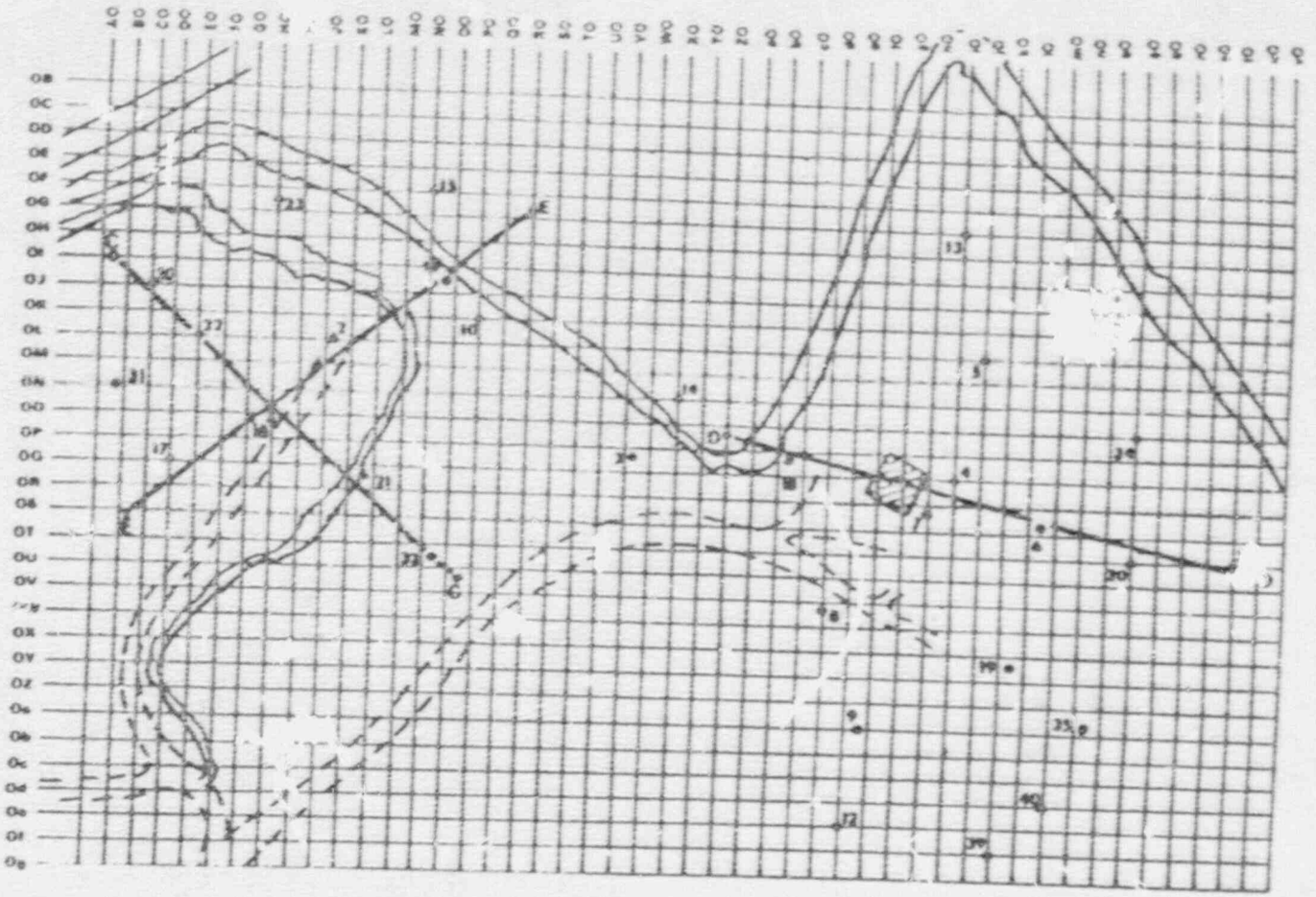
Figure 3.3 Location of surface soil samples, Area 2



Note: Line B-B indicates cross-sectional area shown in Figure 3.7

Source: NUREG/CR-2722, Figure 9, p. 53.

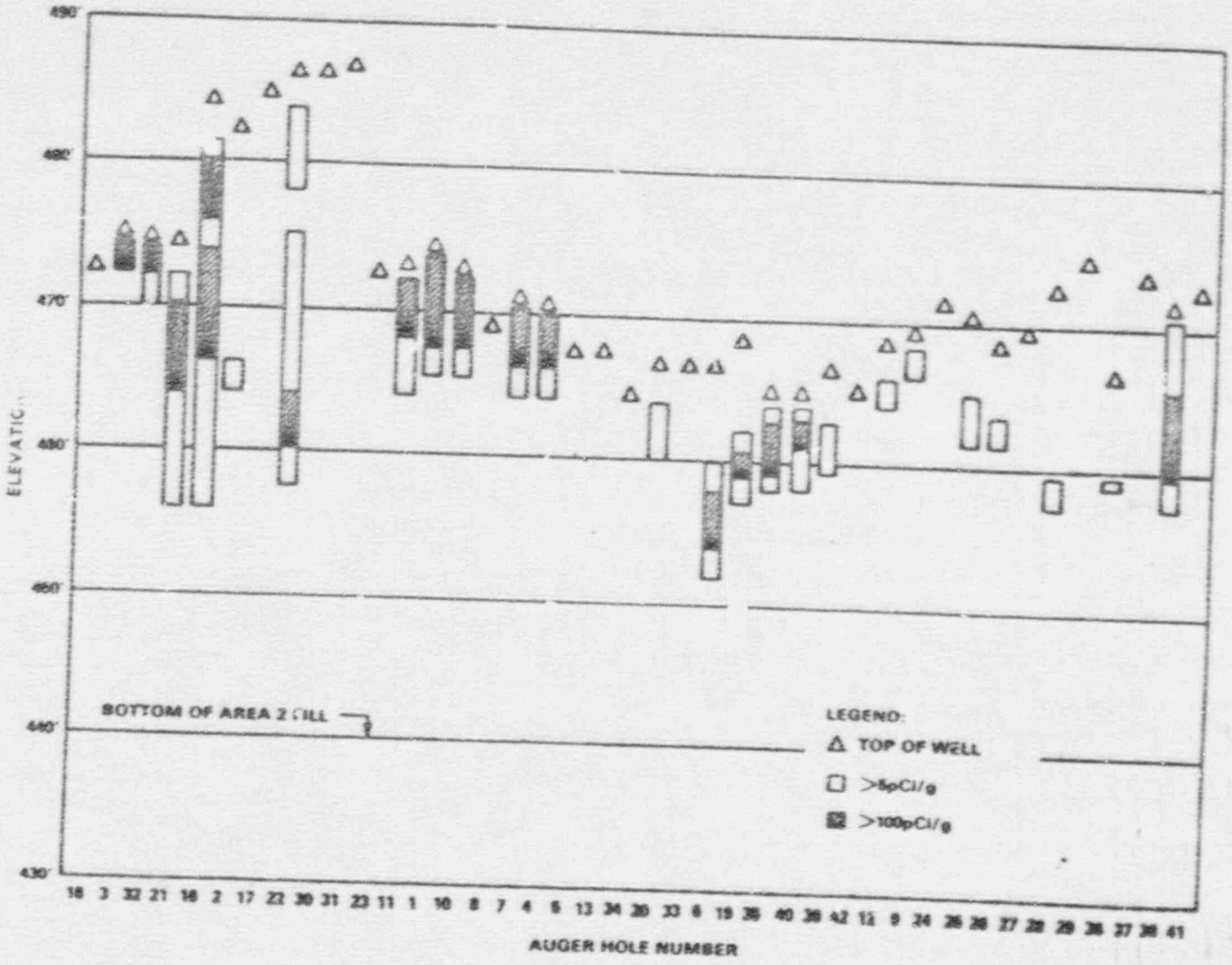
Figure 3.4 Location of auger holes, Area 1



Note: Line E-E indicates cross-sectional area shown in Figure 3.8.

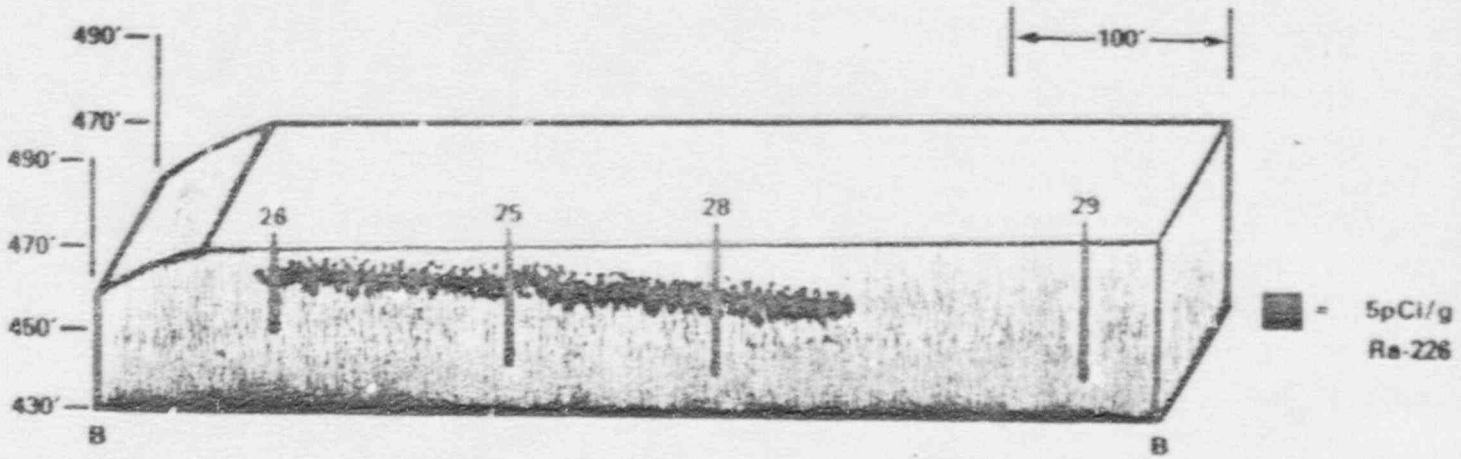
Source: NUREG/CR-2722, Figure 10, p. 34.

Figure 3.5 Location of auger holes, Area 2



Source: NUREG/CR-2722, Figure 14, p. 38.

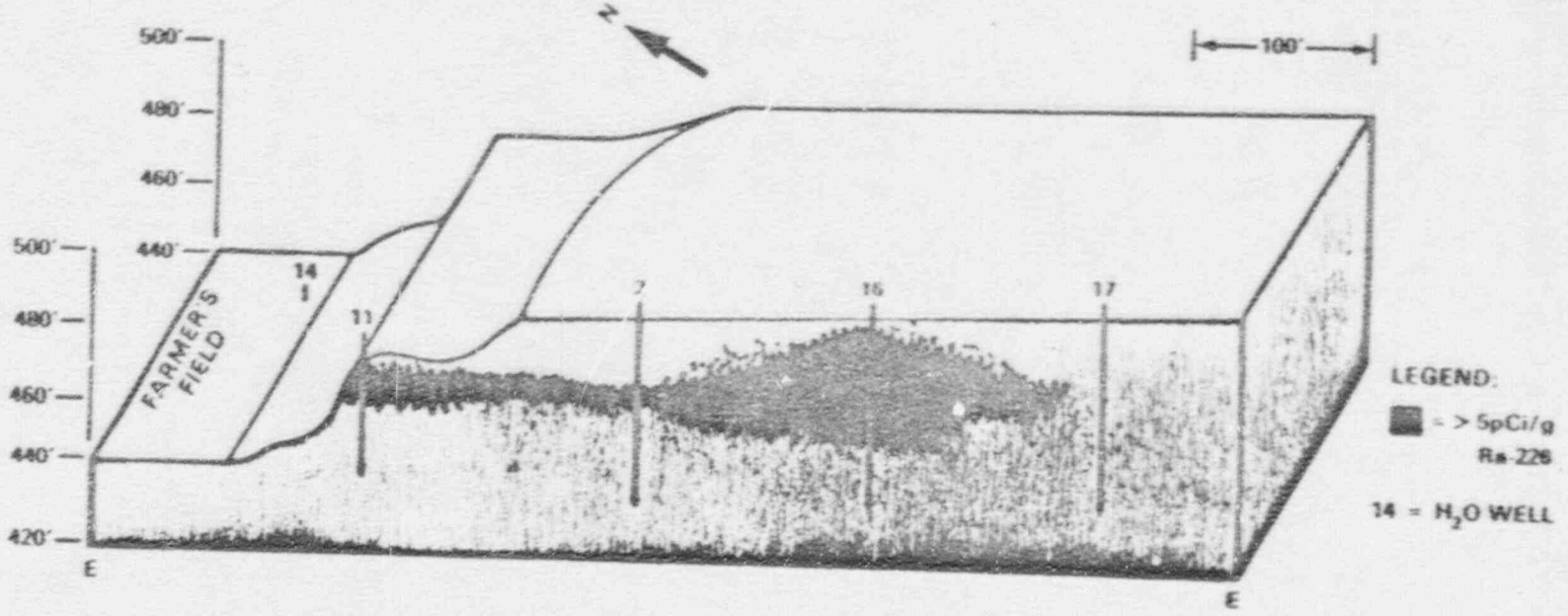
Figure 3.6 Auger hole elevations and location of contamination within each hole



Notes: (1) B-B is defined in Figure 3.4.
(2) The blackened areas indicate the estimated extent of contamination exceeding 5 pCi/g Ra-226, based on surface and auger hole measurements.

Source: NUREG/CR-2722, Figure 16, p. 39.

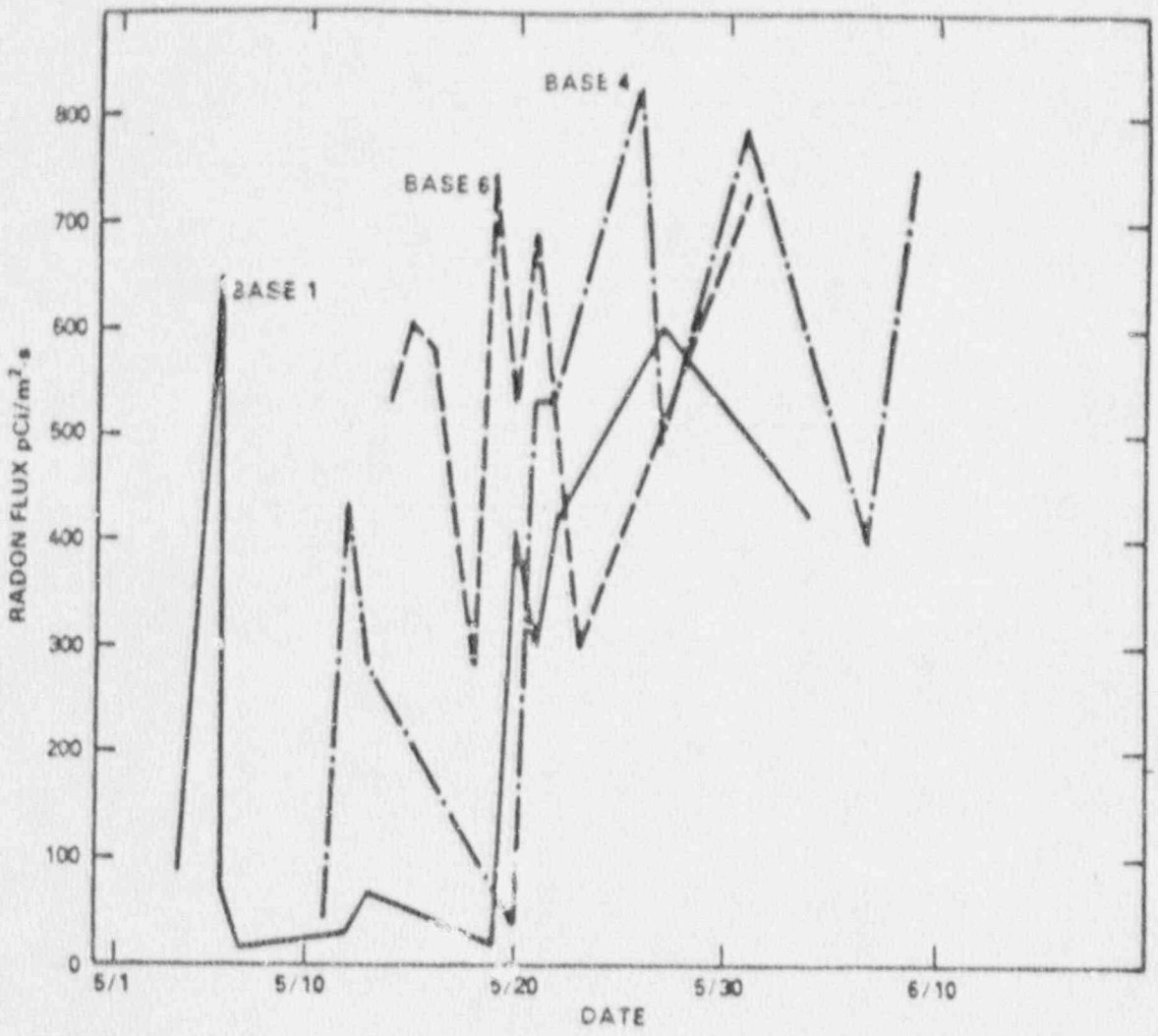
Figure 3.7 Cross-section B-B showing subsurface deposits in Area 1



Notes: (1) E-E is defined in Figure 3.5.
(2) The blackened areas indicate the estimated extent of contamination exceeding 5 pCi/g Ra-226, based on surface and auger hole measurements.

Source: NUREG/CR-2722, Figure 19, p. 42.

Figure 3.8 Cross-section E-E showing subsurface deposits in Area 2



Source: NUREG/CR-2722, Figure 20, p. 43.

Figure 3.9 Rn-222 flux measurements at three locations in Area 2 (1981)

Table 3.1 [illegible] radionuclide analyses of water samples from the West Lake site taken by MDNR in 1981

Sample #	Type of sample*	Gross alpha (pCi/l)	Gross beta (pCi/l)
7001	S	3.11	22.5
7002	S	8.00	23.4
7003	S	1.56	0.88
7019	S	1.91	30.0
7025	S	1.56	36.5
7028	S	45.2	87.8
7029	S	<0.64	<1.34
7030	S	0.52	35.1
7031	S	1.43	26.3
7004	B	1.04	19.7
7021	B	1.56	29.1
7027	B	1.04	32.5
7032	B	<0.05	26.3
7033	B	1.04	29.0
7009	G	4.50	22.3
7010	G	2.60	15.2
7011	G	3.12	10.6
7012	G	7.10	16.6
7017	G	0.52	33.6
7018	G	2.76	36.1
7020	G	8.84	30.1
7026	G	<2.0	33.9
2	G	15.0	41.0
3	G	2.9	7.6

See footnote at end of table.

Table 3.1 (Continued)

Sample #	Type of sample*	Gross alpha (pCi/l)	Gross beta (pCi/l)
7013	L	<3.0	1.30
7014	L	<3.0	130
7015	L	<3.0	103
7016	L	<3.0	98.9
7022	L	3.45	107
7023	L	<3.0	122
7024	L	<3.0	86.7
7034	L	<3.0	10.3
7035	L	<3.0	84.5
7036	L	<3.0	69.6
1	L	7.3	80
4	L	<3.0	26

Sample #	Type of sample*	Ra-226 (pCi/l)	K-40 (pCi/l)
7014	L	<1.6	138
7015	L	3.9	136
7016	L	<1.6	98.9
7022	L	2.4	104
7028	S	1.6	124

*S = surface sample
B = offsite, background
G = groundwater from boreholes
L = leachate

Table 3.2 Radiological quality of water in perimeter monitoring wells of West Lake Landfill (concentrations reported in pCi/l)

Well #	Ra-226	Gross alpha*	Gross beta*	Gross alpha**	Gross beta**
18	-	-	-	12.5	12.5
59	<3	3.2	9.9	-	-
60	-	-	-	20.5	20.8
61	-	-	-	2.7	13.9
62	<3	2.8	7.4	3.5	8.5
63	-	-	-	2.2	7.0
65	<3	12.4	33.1	5.7	6.3
66	<3	4.3	6.9	-	-
67	<3	5	5.3	-	-
68	<3	18.2	18.8	-	-
50***	<3	5	7.7	1.3	8.1

*Samples taken November 15, 1983.
**Samples taken March 21, 1984, by UMC personnel, analyzed by Environmental Health Lab of St. Louis County Health Department, Clayton, Missouri.
***Well #50 used as background.

Table 3.3 Radionuclide concentrations in well water samples: May 7-8, 1986

Radionuclide	Concentrations (pCi/l)						
	Well 50[a]	Well 51	Well 52	Well 53	Well 54	Well 55	Well 56
Gross alpha	2.2	2.2	1.9	11	4.4	4.8	5.7
Gross beta	7.5	4.4	7.5	16	14	14	12
Ra-226	--[b]	--	--	0.4	--	--	0.2
Ra-228	--	--	--	1.7	--	--	0.3
U-total	--	--	--	22	--	--	8.9
Th-228	--	--	--	0.5	--	--	0.3
Th-230	--	--	--	0.9	--	--	0.9
Th-232	--	--	--	0.3	--	--	0.8
Depth to water (m)	5.0	3.8	3.2	3.3	15.5	11.5	11.5

Table 3.3 (Continued)

Radionuclide	Concentrations (pCi/l)						
	Well 58	Well 59	Well 60	Well 61	Well 62	Well 65	Well 66
Gross alpha	5.8	11	14	3.3	5.6	3.5	1.8
Gross beta	15	46	19	14	10	7.4	9.9
Ra-226	0.3	0.3	2.5	--	0.8	--	--
Ra-228	2.9	0.5	1.6	--	0.6	--	--
U-total	13	25	19	--	2.3	--	--
Th-228	0.6	0.5	0.5	--	0.8	--	--
Th-230	1.5	0.2	4.4	--	1.2	--	--
Th-232	0.7	0.1	0.1	--	0.5	--	--
Depth to water (m)	14.0	Not determined	3.5	4.5	4.2	1.9	1.9

Table 3.3 (Continued)

Radionuclide	Concentrations (pCi/l)						
	Well 67	Well 68	Well 72	Well 73	Well 75	Well 76	Well 80
Gross alpha	8.4	0.9	1.4	6.5	11	3.6	0.4
Gross beta	7.1	1.9	4.6	7.7	22	6.9	3.2
Ra-226	0.7			0.3	--	--	--
Ra-228	0.3			0.9	--	--	--
U-total	7.4			3.1	16	--	2.2
Th-228	0.9			1.7	0.6	--	0.3
Th-230	9.9			6.7	12	--	0.0
Th-232	0.2			0.2	0.2	--	0.1
Depth to water (m)	1.5	4.4	10.0	8.4	7.6	13.8	5.3

Table 3.3 (Continued)

Radionuclide	Concentrations (pCi/l)						
	Well 81	Well 82	Well 83	Well 84	Well 87	Well 88	Well 89
Gross alpha	7.9	17	9.0	13	1.5	11	3.7
Gross beta	16	47	18	27	7.2	18	9.1
Ra-226	0.8	0.3	3.4	1.7	--	2.3	--
Ra-228	0.4	0.4	4.6	5.8	--	0.2	--
U-total	4.9	13	1.6	9.0	--	3.0	--
Th-228	0.9	0.4	0.2	0.6	--	1.1	--
Th-230	0.9	1.8	0.4	1.3	--	1.5	--
Th-232	0.3	0.3	1.0	1.1	--	4.0	--
Depth to water (m)	4.8	5.1	3.9	7.0	9.4	8.6	7.5

. ble 3.3 (Continued)

Radionuclide	Concentrations (pCi/l)			
	Well 90	Well 92	Well 93	Well 94
Gross alpha	2.2	7.3	7.4	1.6
Gross beta	6.8	11	22	9.9
Ra-226	--	1.0	1.6	
Ra-228	--	0.8	1.4	
U-total	--	17	6.0	
Th-228	--	0.5	0.8	
Th-230	--	0.1	0.7	
Th-232	--	0.4	1.6	
Depth to water (m)	4.1	13.1	4.7	2.1

[a]Refer to Figure 2.5 for well location.

[b]Dash indicates analysis not performed.

Table 3.4 Radionuclide concentrations in Latty Avenue composite samples

	Concentrations (pCi/gm)								
Sample	U-235	U-238	Th-232*	Th-230	Th-228	Ra-226	Ra-228	Pa-231	Ac-227
Composite 1	3.6 ± 0.3**	82 ± 8	2.3 ± 0.6	8770 ± 100	2.1 ± 0.5	64 ± 1	2.3 ± 0.6	114 ± 2	205 ± 2
Composite 2	4.4 ± 0.3	62 ± 15	1.5 ± 0.5	8950 ± 370	2.0 ± 0.5	50 ± 1	1.5 ± 0.5	117 ± 8	Not Performed
Average	4.0 ± 0.2	72 ± 9	1.9 ± 0.4	8860 ± 190	2.1 ± 0.3	57 ± 1	1.9 ± 0.4	116 ± 4	205 ± 2

*Based on Ra-228 and assumption of secular equilibrium of thorium decay series.
**Errors are 2σ based only on counting statistics.

Source: Table 2 (Cole, 1981).

4 APPLICABILITY OF THE BRANCH TECHNICAL POSITION

The NRC has established a Branch Technical Position (BTP) which identifies five acceptable options for disposal or onsite storage of wastes containing low levels of uranium and thorium (46 FR 52061, October 23, 1981). Options 1-4 provide methods under 10 CFR 20.302, for onsite disposal of slightly contaminated materials, e.g., soil, if the concentrations of radioactivity are small enough and other circumstances are satisfactory. The fifth option consists of onsite storage pending availability of an appropriate disposal method. Table 4.1 shows the radionuclide concentrations specified for the disposal options.

The material present in the West Lake Landfill is a form of natural uranium with daughters, although the daughters are not now in equilibrium. As mentioned above, the average concentration of Ra-226 in the West Lake Landfill wastes is about 90 pCi per gram, which (considered by itself) falls into Option 4 of the BTP since Option 4 criteria are controlled by the Ra-226 content in the wastes (i.e., 200 pCi of U-238 plus U-234 per gram would be accompanied by 100 pCi of Ra-226 per gram). However, because of the large ratio of Th-230 radioactivity to that of Ra-226, the radioactive decay of the Th-230 will increase the concentration of its decay product Ra-226 until these two radionuclides are again in equilibrium. Assuming the ratio of activities of 100:1 used above, the Ra-226 activity will increase by a factor of five over the next 100 years, by a factor of nine 200 years from now, and by a factor of thirty-five 1000 years from now. All radionuclides in the decay chain after Ra-226 (and thus the Rn-222 gas flux) will also be increased by similar multiples. Therefore, the long-term Ra-226 concentration will exceed the Option 4 criteria.

Table 4.1 Summary of maximum soil concentrations permitted under disposal options

Source: 46 Federal Register 52061

Kind of material	Disposal options			
	1[a]	2[b]	3[c]	4[d]
Natural thorium (Th-232 + Th-228) with daughters present and in equilibrium. (pCi/g)	10	50	-	500
Natural uranium (U-238 + U-234) with daughters present and in equilibrium. (pCi/g)	10	-	40	200

[a]Based on EPA uranium mill tailings cleanup standards.

[b]Concentrations based on limiting individual intruder doses to 170 mrem per year.

[c]Concentration based on limiting equivalent exposure to 0.02 WL or less.

[d]Concentrations based on limiting individual intruder doses to 500 mrem per year and, in cases of natural uranium, limiting exposure to Rn-222 and its decay product airborne alpha emitters to 0.02 WL or less.

5 REMEDIAL ACTION ALTERNATIVE CONSIDERATIONS

The radioactive material as it presently exists does not pose an immediate health hazard for individuals living or working in the area of the landfill. However, there is a long-term potential for the radioactive material to pose a health problem. Therefore, this section discusses six (A-F) possible courses of action, of which all but A and D are considered temporary. Option A, in which no remedial action is proposed, is unacceptable because the concentrations of radionuclides in the landfill will become too high; Option A is described for comparison purposes only. Costs are based on the Dodge Guide to Public Works and Heavy Construction, 1984.

5.1 Option A: No Remedial Action

Under Option A, no remedial work would be done on the West Lake site. The landfill and the radioactive soil would be left in their present condition. The contaminated areas would be available for demolition fill emplacement and final closure. It is not certain how much additional fill would be emplaced. Filling would be followed by normal landfill closure operations.

Normal closure procedures consist of applying at least 0.61 m (2 ft) of compacted final cover. A 0.3-m (1 ft) layer of topsoil would be placed over the cover and upgraded to support vegetation. Establishment of a vegetative cover would require seeding, liming, and fertilization. Surface seeps of leachate would be eliminated. Maintenance of the monitoring wells would be required to allow continued sampling by MDNR, should MDNR require such action. The public would be discouraged from entering the site. After closure, a detailed description of the site would be filed with the County Recorder of Deeds. This description would include: a legal description of the site, types and location of wastes present, depth of fill, and description of any environmental control or monitoring systems requiring future maintenance (MDNR, January 1983). MDNR regulations also specifically prohibit excavation or disruption of the closed landfill without written approval of MDNR; no time frame is stated with this regulation (MDNR, 1975).

There would be no further cost under this option since no remedial actions would be taken; i.e., costs are normal landfill costs.

5.2 Option: Stabilization on Site With Restricted Land Use

Two areas in the landfill contain radioactive material. Therefore, the work required for this option is described separately for each area. Nevertheless, restrictions would be imposed on the use of land within each area. This would discourage future activities on these areas which might expose individuals to radioactivity. No additional landfill would be permitted to be deposited on either area.

Area 1

It is believed that a total of 2 to 3 m (7 to 10 ft) of soil has been added to most of Area 1 since the 1981 land survey by RMC. This cover has altered the radiation environment of the site. Measurements by Oak Ridge Associated Universities (ORAU) personnel in March 1984 (Berger) showed that only a very small area exceeded the exposure rate of 20 μR/hr at 1 m. By extending the cover 20 m (66 ft) outward in all directions from the area showing an unacceptable surface exposure rate, the shallow wastes likely to give high rates of radon emanation will also be covered. The amount of radioactive debris in Area 1 is relatively minor compared with that present in Area 2. Therefore, a soil cover of 1.5 m (5 ft) is considered adequate to reduce surface exposure rates and radon emanation. After the soil cover is in place, a layer of topsoil 0.3 m (1 ft) thick would be emplaced, seeded, and mulched.

Area 2

Vegetation over Area 2 as well as on the slope of the berm would be cleared and placed in the demolition portion of the landfill or disposed of as is convenient. Brush should not be left in place and covered since this may reduce the integrity of the soil cap. Grass should be mowed, and may be left in place.

The berm on the northwest portion of the landfill which contains an estimated 7,500 m^3 (9,800 yd^3) of contaminated soil would be excavated and redeposited in

layers in a secure portion of the landfill. The actual amount can be determined by survey during implementation of the work.

All equipment and materials now stored over Area 2 would be removed to other portions of the site or disposed of as is convenient to the owners. Gravel piles found on Area 2 should be removed to other portions of the site after having been surveyed to ensure that contaminants have not been mixed with the gravel. However, the lower 10 to 15 cm (4 to 6 in.) of rock should be left in place and covered with the soil cap, since this gravel may have become mixed with contaminated soil.

Such stabilization would place the contaminated soil well below the surface and would prevent radioactive materials from eroding as can now occur along sections of the berm. Stabilization would require emplacement of a soil cover of 48,000 m^3 (63,000 yd^3) to give a final slope of 3:1 with 1.5 m (5 ft) of soil at the top of the berm. At least 1.5 m (5 ft) of soil cover would be used, as this much soil will be required to reduce radon gas exhalation. The final slope of 3:1 on the berm would be shallow enough to prevent failure and, after the cover is emplaced, it should be further covered with at least 0.3 m (1 ft) of topsoil and seeded with native grasses to prevent erosion. The slope would be directed radially outward from the center of the cap. An interceptor ditch would be provided around the cap to channel runoff and prevent gullies from being cut into the stabilized cover. The cover soil presently used in the landfilling operations may be used to stabilize the berm. This soil is a clay silt (loess) excavated near the West Lake Landfill site.

The portion of Area 2 to be covered by the soil cap includes that portion of the landfill identified in the RMC survey as having surface exposure rates greater than 20 μR/hr at 1 m (3.3 ft) above ground level, along with those areas in which auger holes revealed radium-bearing soil within 1 m of the surface. The shallow contaminants may be sufficiently shielded to produce low surface exposure rates; however, these shallow deposits will still produce radon emanations greater than the desired level of 20 pCi/m^2s. Therefore, the soil cover must be extended over these areas of shallow contamination.

The cover soil used should be capable of compaction to a permeability of less than 10^{-7} cm/s in order to keep radon release and soil leaching as low as possible. This value is based on common practices used for sealing of hazardous waste landfills. Because accurately measuring permeability of this magnitude is difficult, the value of 10^{-7} cm/s should be used only as a target criterion which should, if possible, be bettered. If laboratory testing of the cover soil presently used at the West Lake Landfill indicates that this permeability can be achieved, this soil would be acceptable for use as the soil cap. Otherwise, clay soil would have to be imported from off the site to be used in constructing the soil cap.

The overall estimated cost for the required work under Option B is approximately $360,000 (Table 5.1) and would require about 2 months to complete. Costs of this option may be higher if the total quantity of contaminated material to be moved is higher than the estimated quantity.

5.3 Option C: Extending the Landfill Off Site

Soil eroding on the northwest berm of Area 2 is carrying contaminated soil off the landfill property onto an adjacent cultivated field. A contributing factor to the erosion is the steepness of the berm. It would, therefore, be desirable to lessen the slope's steepness by extending the berm onto the adjacent field. This option would require the acquisition of approximately 2 ha (5 acres) of land not owned by the landfill company.

In this option, Area 1 would be treated the same as in Option B. The contaminated portion of the northwestern berm of Area 2 would not be disturbed. Instead the existing berm would be extended 13 to 16 m (42 to 52 ft) onto the adjacent field. This would require an additional solid volume of approximately 20,200 m^3 (26,400 yd^3) to give a final slope of 3:1 with 1.5 m (5 ft) of soil on top of the berm. As in Option B, this cover should receive an additional 0.3 m (1 ft) of topsoil and be seeded with native grasses to prevent erosion.

This option will require the relocation of three transmission poles. All other necessary work for Option C is as described for Option B.

The overall estimated cost for required work under Option C is approximately $470,000 (Table 5.2) and would require about 2 months to complete. The extent of work required under this option is well defined.

5.4 Option D: Removing Radioactive Soil and Relocating It

This option would involve excavating and removing all contaminated soil and debris from the West Lake Landfill and relocating it to an authorized disposal facility.

Vegetation over Areas 1 and 2 would be cleared and placed in the demolition portion of the West Lake Landfill.

All equipment stored on the two contaminated areas would be removed to another portion of the site. Gravel piles in Area 2 should be removed. The lower 10 to 15 cm (4 to 6 in.) of rock should be left in place to be disposed of with other contaminated materials, since this gravel may have become mixed with contaminated soil at the surface.

The areas known to contain radioactive contamination at levels above the action criteria (20 μR/hr at 1 m) would be excavated initially. Next, the excavated area would be surveyed to determine the extent of contamination remaining. Excavation would continue until unacceptable levels of contamination have been removed. Immediately after excavation, the soil would be placed in 208-liter (55 gal) approved drums (or other approved containers) for transport. Containment in the drums will prevent the spread of dust and loose soil during transport.

Some of the nonradiological hazardous material known to be present in the landfill could present a serious danger to workers should they excavate into this material. Proper precautions should, therefore, be taken as the work is being performed.

Estimated costs under Option D would be $2,500,000 (Table 5.3). Transporting the contaminated soil to another site and emplacing the material there would significantly add to the cost. This option could be completed in about

3 months, providing that a suitable disposal facility were available to receive the contaminated waste.

5.5 Option E: Excavation and Temporary Onsite Storage in a Trench

Under this option, as much radioactive soil would be excavated as in Option D and would be placed in a specially prepared trench on the West Lake site but would not be placed in drums. This trench would become a temporary repository for the radioactive soil. The trench would be surrounded by an impervious clay liner to minimize leachate production and transport into the groundwater system. The cap should give acceptable rates of surface exposure and acceptable rates of radon gas release.

As under Option D, surface vegetation, machinery, and piles of crushed rock would be removed from the surface of areas to be excavated. Design of the trench is based upon the "secure landfill concept" (Shuster and Wagner, 1980) with three primary functions: eliminate direct gamma-ray exposure at the ground surface, reduce radon emanation, and prevent leaching of radionuclides to the groundwater system.

The excavated area would be cut to a maximum elevation of 140 m (460 ft) msl over the area to be covered by the trench. The base of the trench would cover an area 120 x 120 m (394 x 394 ft) and would have a negligible slope. Low spots would be filled with borrow soil* compacted to at least 90% of its standard Proctor density (SPD). Once the base for the trench has been leveled to a final elevation of about 140 m (460 ft) msl, a blanket of borrow soil at least 1.5 m (5 ft) thick compacted to at least 90% SPD would be emplaced. Specification of compaction of this underlayer is based on the requirement of avoiding subsidence which could cause the clay liner to crack and fail. A clay liner would be placed above the underlayer. The liner would be 0.5 m (1.6 ft) thick and would have a permeability less than 10^{-8} cm/s (4×10^{-9} in./s). An impermeable plastic liner could also be used.

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*Borrow soil refers to a clayey-silt loess (Soil Conservation Service type CL) excavated southeast of the site for use as daily cover in the landfilling operation.

Sides of the trench would be built at a 3:1 slope up to the level of the surrounding undisturbed landfill surface, about 143 m (470 ft) msl. The walls would consist of an underlayer and liner as described for the base. A layer of crusher-run limestone 0.5 m (1.6 ft) thick would be placed on top of the liner to allow leachate buildup in the trench to be monitored and to facilitate pumping should leachate buildup become a problem.

After the base and walls of the trench have been built, the previously excavated debris would be placed in the trench. Then the remaining radioactive debris would be excavated and placed in the trench. As excavation proceeds, it will become apparent how much volume the trench must have to contain all the contaminated soil. At this point, the walls of the trench would be raised to an appropriate level. Excavation and filling can then proceed until the work is complete. The final thickness of debris is expected to be from 4 to 6 m (13 to 20 ft).

A cover, as described below, would be placed over the debris. A 1 m (3 ft) layer of borrow soil compacted to 90% SPD will be placed over the debris. A clay liner 0.5 m (1.6 ft) thick of permeability less than 10^{-8} cm/s (4×10^{-9} in./s) would be placed over the borrow soil blanket. A 0.5-m (1.6-ft) layer of crusher-run limestone would be placed over the clay layer to prevent infiltration water from building up over the liner. A cover soil laye of average thickness about 2 m (7 ft) would be placed over the rock layer.

The cover soil would be compacted and built with a surface slope of from 2% to 4% to minimize erosion. Three-tenths of a meter (1 ft) of top soil would be placed over the cover layer and would be seeded and mulched to establish a vegetative cover.

Once the trench has been prepared to accept the soil, workers may begin to excavate contaminated soil. As under Option C, an initial excavation would remove the area of known contamination, and a cleanup phase would remove all soil containing radionuclide concentrations above an action level of 15 pCi/g Ra-226. As soon as the soil has been excavated, it would be hauled to the trench and emplaced. The contaminated soil should be sufficiently compacted to

prevent settling, to maintain the integrity of the soil cap. As fill is being emplaced, the pipe for a monitoring well would be extended upward from the base of the gravel underdrain. This well should be designed in a manner that would allow future installation of a pump for drawing off leachate should this become necessary.

Costs for Option E would be approximately $2,150,000 (Table 5.4). The estimated costs vary somewhat, since the exact limits of excavation cannot be defined until work begins. This work would require approximately 4 months to complete.

5.6 Option F: Construction of a Slurry Wall to Prevent Offsite Leachate Migration

Under Option F, radioactive soil would be left in place at the West Lake site. The wastes would be stabilized by means of a soil cover (as under Option B) and a downgradient slurry wall would be built around the contaminated soil. The slurry wall would be intended to keep leachate from migrating off site. This remedial action would be somewhat more effective than Option B in reducing the potential for groundwater contamination. However, costs incurred would be substantially higher than those for Option B or C. Benefits would be nearly identical to those derived by the soil cover and berm stabilization alone; the sole advantage of Option F over Option B or C would be greater protection to groundwater in the Missouri River alluvium.

Vegetation, machinery, and piles of crushed rock would have to be removed as described for Option B. A slurry wall would be constructed by excavating a trench [approximately 1 m (3.3 ft) wide] to the depth of bedrock. This trench would be bored out in the presence of a mud weighted with bentonite (clay) to keep the walls from collapsing and to keep groundwater from intruding into the trench. The trench would be excavated in sections 6 to 8 m (20 to 26 ft) long. Once a section of trench has been excavated, concrete would be poured by tremie into the trench to displace the slurry. The final slurry walls would each consist of a concrete slab about 1 m (3.3 ft) thick extending to bedrock and partially encircling the bodies of radioactive soil in both Areas 1 and 4. A total of approximately 1300 linear meters (4,300 ft) of wall would be constructed to depths varying from 5 to 15 m (16 to 50 ft).

After each of the slurry walls had been emplaced, fill would be added along the face of the berm to stabilize the slope. Finally, a soil cover would be placed over the contaminated areas. The berm would be stabilized and the soil cover would be placed as outlined for Option B.

Costs of work required for Option F would be approximately $5,600,000 (Table 5.5). The exact amount of slurry wall cannot be determined until work is begun; therefore, this cost will be highly variable. Since the walls should extend to bedrock, the depth of soil and landfill debris will govern the depth of the required wall. Slight errors in estimating the depth of alluvium could result in large errors in the cost estimate. It is estimated that it would take 6 to 8 months to complete this option.

Table 5.1 Itemized cost of remedial action, Option B

Item	Quantity	Unit price	Cost	Reference
Clearing and grubbing	2.9 ha	$1850/ha	$ 5,365	*
Remove Shuman Building	--	--	$ 6,200	**
Excavate contaminated soil and redeposit it at a secure site	7500 m^3	$10/$m^3$	$ 75,000	†
Emplace soil cover	48,000 m^3	$4.64/$m^3$	$222,720	†
Bury clean rubble	225 m^3	$12.50/$m^3$	$ 2,812	†
Seed and mulch cover	3.3 ha	$2165/ha	$ 7,145	*
Subtotal			$319,242	
Contingency @ 10%			31,924	
Engineering and legal fees @ 5%			15,962	
Estimated total cost			$360,000††	

*Dodge Guide to Public Works and Heavy Construction, 1984.

**Ford, Bacon and Davis Utah, Inc., "Engineering Evaluation of the Latty Avenue Site, Hazelwood, Missouri," NRC Contract No. NRC-02-77-197, 1978. (This Butler-type building has already been removed.)

†Based on best estimated cost.
††Adjusted for deletion of building removal.

Table 5.2 Itemized cost of remedial action, Option C

Item	Quantity	Unit price	Cost	Reference
Clearing and grubbing	2.9 ha	$1850/ha	$ 5,365	*
Remove Shuman Building	--	--	$ 6,200	**
Relocate power transmission poles	3	$2060	$ 6,180	†
Stablize berm (fill)	20,200 m^3	$6.70/$m^3$	$135,340	†
Emplace soil cover	48,000 m^3	$4.64/$m^3$	$222,720	†
Bury clean rubble	225 m^3	$12.50/$m^3$	$ 2,812	†
Seed and mulch cover	3.3 ha	$2165/ha	$ 7,145	*
Subtotal			$385,762	
Contingency @ 10%			38,576	
Engineering and legal fees @ 5%			19,290	
Land acquisition	2 ha	$15,500/ha	31,000	
Estimated total cost			$470,000	

*Dodge Guide to Public Works and Heavy Construction, 1984.

**Ford, Bacon and Davis Utah, Inc., "Engineering Evaluation of the Latty Avenue Site, Hazelwood, Missouri," NRC Contract No. NRC-02-77-197, 1978. (This Butler-type building has already been removed.)

†Based on best estimated cost.

Table 5.3 Itemized cost of remedial action, Option D

Item	Quantity	Unit price	Cost	Reference
Clearing and grubbing	2.9 ha	$1850/ha	$ 5,365	*
Remove Shuman Building	--	--	$ 6,200	**
Bury clean rubble	230 m^3	$12.5/m^3	$ 2,875	†
Excavate contaminated soil	70,000 m^3	$5.25/m^3	$ 367,500	†,††
Site decontamination	27,600 m^3	$1.4/m^2	$ 38,640	***
Packing waste for transportation	70,000 m^3	$25/m^3	$1,750,000	†
Subtotal			$2,170,580	
Contingency @ 10%			217,058	
Engineering and legal fees @ 5%			108,529	
Estimated total cost			$2,500,000***	

*Dodge Guide to Public Works and Heavy Construction, 1984.

**Ford, Bacon and Davis Utah, Inc., "Engineering Evaluation of the Latty Avenue Site, Hazelwood, Missouri," NRC Contract No. NRC-02-77-197, 1978. (This Butler-type building has already been removed.)

***No costs have been included here for moving the waste, for emplacing it and for disposal facility users fees.

†Based upon best estimate.

††Estimated quantity of soil having Ra-226 concentrations of 15 pCi/g or more.

Table 5.4 Itemized cost of remedial action, Option E

Item	Quantity	Unit price	Cost	Reference
Prepare secure trench	80,000 m^3	\$9/m^3	\$ 720,000	*
Clearing and grubbing	2.9 ha	\$1,850/ha	\$ 5,365	*
Remove Shuman building			\$ 6,200	**
Bury clean rubble	230 m^3	\$12.5/m^3	\$ 2,875	*
Excavate contaminated soil	70,000 m^3	\$5.25/m^3	\$ 367,500	*
Site decontamination	27,600 m^3	\$1.40/m^3	\$ 38,640	†
Emplace contaminated soil	70,000 m^3	\$10.3/m^3	\$ 722,200	*
Monitoring well	---	---	\$ 6,000	*
Seed and mulch cover	0.08 ha	\$2,165/ha	\$ 200	†
Subtotal			\$1,868,980	
Contingency @ 10%			186,900	
Engineering and legal fees @ 5%			93,450	
Estimated total cost			\$2,150,000	

* Dodge Guide to Public Works and Heavy Construction, 1984.

**Ford, Bacon and Davis Utah, Inc., "Engineering Evaluation of the Latty Avenue Site, Hazelwood, Missouri," NRC Contract No. NRC-02-77-197, 1978. (This Butler-type building has already been removed.)

† Based on best estimate.

Table 5.5 Itemized cost of remedial action, Option F

Item	Quantity	Unit price	Cost	Reference
Clearing and grubbing	2.9 ha	$1,850/ha	$ 5,365	*
Remove Shuman building			$ 6,200	**
Relocate power transmission poles	7 poles	$2,060/@	$ 14,420	†
Construct slurry wall	11,000 m^2	$4 ./$m^2$	$4,422,000	*
Stabilize berm	20,200 m^3	$6.70/$m^3$	$ 135,340	†
Emplace soil cap	48,000 m^3	$4.64/$m^3$	$ 222,720	†
Bury clean rubble	225 m^3	$12.5/$m^3$	$ 2,812	†
Seed and mulch cover	3.3 ha	$2,165/ha	$ 7,145	*
Subtotal			$4,816,002	
Contingency @ 10%			481,600	
Engineering and legal fees @ 5%			240,800	
Land acquisition	2 ha	$15,500/ha	31,000	
Estimated total cost			$5,600,000	

*Dodge Guide to Public Works and Heavy Construction, 1984.

**Ford, Bacon and Davis Utah, Inc., "Engineering Evaluation of the Latty Avenue Site, Hazelwood, Missouri," NRC Contract No. NRC-02-77-197, 1978. (This Butler-type building has already been removed.)

†Based on best estimate.

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H 6

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT PRIOR TO RELEASE FOR UNRESTRICTED USE OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE, OR SPECIAL NUCLEAR MATERIAL

U. S. Atomic Energy Commission
Directorate of Licensing
Materials Branch
Washington, D.C. 20545

December, 1973

Reference 4 (4 pages)

~~8009040109~~

4 pp

B/5

The instructions in this guide in conjunction with Tables I and II specify the radioactivity and radiation exposure rate limits which should be used in accomplishing the decontamination and survey of surfaces of premises and equipment prior to abandonment or release for unrestricted use. The limits in Tables I and II do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control will be considered on a case-by-case basis.

1. The licensee shall make a reasonable effort to eliminate residual contamination.

2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Tables I or II prior to applying the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.

3. The radioactivity on the interior surfaces of pipes, drain lines, or ductwork shall be determined by making measurements at all traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purposes of measurement shall be presumed to be contaminated in excess of the limits.

4. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer of premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such requests must:

   a. Provide detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.

   b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Tables I or II. A copy of the survey report shall be filed with the Director, Materials Branch, Directorate of Licensing, USAEC, Washington, D.C. 20545, and also the Director of the Regional Office of the Directorate of Regulatory Operations, USAEC, having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:

   a. Identify the premises.

   b. Show that reasonable effort has been made to eliminate residual contamination.

   c. Describe the scope of the survey and general procedures followed.

   d. State the findings of the surevey in units specified in the instruction.

Following review of the report, the AEC will consider visiting the facilities to confirm the survey.

SURFACE CONTAMINATION LEVELS[1]

ISOTOPE[2]	TABLE I TOTAL[3]	TABLE I REMOVABLE[3][4]	TABLE II TOTAL[3]	TABLE II REMOVABLE[3][4]
U-nat, U-235, U-238, Th-nat, Th-232, and associated decay products	10,000 dpm α/100 cm²	1,000 dpm α/100 cm²	Average[6] 5,000 dpm α/100 cm² Maximum 25,000 dpm α/100 cm²	1,000 dpm α/100 cm²
Other isotopes which decay by alpha emission or by spontaneous fission	1,000 dpm α/100 cm²	100 dpm α/100 cm²	Average[6] 500 dpm α/100 cm² Maximum 2,500 dpm α/100 cm²	100 dpm α/100 cm²
Beta-gamma emitters (isotopes with decay modes other than alpha emission or spontaneous fission)	0.4 mrad/hr at 1 cm[5]	1,000 dpm β-γ/100 cm²	Average[5] 0.2 mrad/hr at 1 cm[5] Maximum 1.0 mrad/hr at 1 cm[5]	1,000 dpm β-γ/100 cm²

(1) Either Table I or Table II may be used. For example, if all beta-gamma readings were less than 0.4 mrad/hr at 1 cm, Table I could be used; but if the maximum reading were 0.8 mrad/hr, material could be released under Table II providing the average was less than 0.2 mrad/hr.

(2) Where surface contamination by both alpha and beta-gamma emitting isotopes exists, the limits established for alpha and beta-gamma emitting isotopes shall apply independently.

(3) As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector and count rate meter for background, efficiency, and geometric factors associated with the instrumentation.

(4) The amount of removable radioactive material per 100 cm² of surface area shall be determined by wiping that area with dry filter or soft absorbent paper and with the application of moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. In determining removable contamination on objects of lesser surface area, the pertinent levels shall be reduced proportionally, and the entire surface shall be wiped

(5) Measured through not more than 7 milligrams per square centimeter of total absorber.

(5) Measurements of total contaminant shall not be averaged over more than 10 square meters. For objects of lesser surface area, the average shall be derived for each such object.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEP 07 1990

MEMORANDUM FOR: John H. Austin, Chief
Regulatory Branch
Division of Low Level Waste
Management and Decommissioning, NMSS

FROM: Charles J. Haughney, Chief
Fuel Cycle Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

SUBJECT: TRANSFER OF WEST LAKE LANDFILL

This memorandum is written confirmation of the transfer of project management responsibility for the West Lake Landfill, Bridgeton, MO, Docket No. 40-8801, from the Fuel Cycle Safety Branch, Division of Industrial and Medical Nuclear Safety, to the Regulatory Branch, Division of Low Level Waste Management and Decommissioning, as arranged in our meeting with Robert M. Bernero, Director, Office of Nuclear Material Safety and Safeguards, on August 29, 1990. The transfer is effective as of the date of this memorandum.

George H Bidinger
for Charles J. Haughney, Chief
Fuel Cycle Safety Branch
Division of Industrial and
Medical Nuclear Safety
Office of Nuclear Material Safety
and Safeguards

9009110340

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UNITED STATES
ATOMIC ENERGY COMMISSION
Post Office Box 475
St. Charles, Missouri 63301

M:FMD

February 28, 1966

Mr. J. J. Donovan, Executive Vice President
Continental Mining & Milling Co.
Suite 833
208 South La Salle Street
Chicago, Illinois 60604

Subject: NOTICE TO PROCEED
CONTRACT NO. AT-(23-2)-56

Dear Mr. Donovan:

Pursuant to the terms and conditions of the subject bill of sale, you are hereby authorized to proceed with the removal of the personal property described therein.

Very truly yours,

F. H. Belcher
Area Manager

FMD/dcc

4004250200

Encl. 6

STANDARD FORM 25
(Revised April, 1965)
GENERAL SERVICES ADMINISTRATION
FPR (41 CFR) 1-16.801

PERFORMANCE BOND

(See Instructions on Reverse)

Enter date of contract: 2-25-66

PRINCIPAL (Legal name and business address)

Continental Mining & Milling Co.
200 South LaSalle Street
Chicago, Illinois 60604

TYPE OF ORGANIZATION ("X" one)

☐ INDIVIDUAL ☐ PARTNERSHIP
☐ JOINT VENTURE ☒ CORPORATION

STATE OF INCORPORATION: Delaware

SURETY(IES) (Name(s) and business address(es))

Hartford Accident & Indemnity Company
Hartford Plaza
Chicago, Illinois 60600

PENAL SUM OF BOND

MILLION(S)	THOUSAND(S)	HUNDRED(S)	CENT(S)
-------	Fifty	-------	-------

CONTRACT DATE: February 25, 1966

CONTRACT NO.: AT-(29-2)-56

KNOW ALL MEN BY THESE PRESENTS, That we, the Principal and Surety(ies) hereto, are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally: *Provided*, That, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety, but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered into the contract identified above;

NOW, THEREFORE, if the Principal shall perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the Government, with or without notice to the Surety(ies), and during the life of any guaranty required under the contract, and shall also perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety(ies) being hereby waived, then the above obligation shall be void and of no effect.

IN WITNESS WHEREOF, the Principal and Surety(ies) have executed this performance bond and have affixed their seals on the date set forth above.

PRINCIPAL

	1.	2.	
Signature(s)	Clemons M. Roark (Seal)	(Seal)	Corporate Seal
Name(s) & Title(s) (Typed)	1. Clemons M. Roark Vice President	2.	

INDIVIDUAL SURETY(IES)

	1.	2.
Signature(s)	(Seal)	(Seal)
Name(s) (Typed)	1.	2.

CORPORATE SURETY(IES)

	Name & Address	STATE OF INC.	LIABILITY LIMIT	
SURETY A	Hartford Accident & Indemnity Company, Chicago, Illinois	Conn.	50,000.00	Corporate Seal
	Signature(s): 1. Donald Cleveland 2.			
	Name(s) & Title(s) (Typed): 1. Donald Cleveland, Attorney-in-Fact 2.			

Seal 4

	Name & Address		STATE OF INC.	LIABILITY LIMIT	Corporate Seal
	Signature(s)	1.	2.	
	Name(s) & Title(s) (Typed)	1.	2.	
SURETY C	Name & Address		STATE OF INC.	LIABILITY LIMIT	Corporate Seal
	Signature(s)	1.	2.	
	Name(s) & Title(s) (Typed)	1.	2.	
SURETY D	Name & Address		STATE OF INC.	LIABILITY LIMIT	Corporate Seal
	Signature(s)	1.	2.	
	Name(s) & Title(s) (Typed)	1.	2.	
SURETY E	Name & Address		STATE OF INC.	LIABILITY LIMIT	Corporate Seal
	Signature(s)	1.	2.	
	Name(s) & Title(s) (Typed)	1.	2.	
SURETY F	Name & Address		STATE OF INC.	LIABILITY LIMIT	Corporate Seal
	Signature(s)	1.	2.	
	Name(s) & Title(s) (Typed)	1.	2.	
SURETY G	Name & Address		STATE OF INC.	LIABILITY LIMIT	Corporate Seal
	Signature(s)	1.	2.	
	Name(s) & Title(s) (Typed)	1.	2.	

BOND PREMIUM ▷	RATE PER THOUSAND	TOTAL
	$15.00	$750.00

INSTRUCTIONS

1. This form is authorized for use in connection with contracts for construction work or the furnishing of supplies or services. There shall be no deviation from this form without approval by the Administrator of General Services.

2. The full legal name and business address of the Principal shall be inserted in the space designated "Principal" on the face of this form. The bond shall be signed by an authorized person. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved, evidence of his authority must be furnished.

3. (a) Corporations executing the bond as sureties must be among those appearing on the Treasury Department's list of approved sureties and must be acting within the limitations set forth therein. Where more than a single corporate surety is involved, their names and addresses (city and State) shall be inserted in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)", and in the space designated "SURETY(IES)" on the face of this form only the letter identification of the Sureties shall be inserted.

(b) Where individual sureties execute the bond, they shall be two or more responsible persons. A completed Affidavit of Individual Surety (Standard Form 28), for each individual surety, shall accompany the bond. Such sureties may be required to furnish additional substantiating information concerning their assets and financial capability as the Government may require.

4. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Seal"; and, if executed in Maine or New Hampshire, shall also affix an adhesive seal.

5. The name of each person signing this performance bond should be typed in the space provided.

U.S. GOVERNMENT PRINTING OFFICE : 1966 O-794-988

HARTFORD, CONNECTICUT

POWER OF ATTORNEY

Know all men by these Presents, That the HARTFORD ACCIDENT AND INDEMNITY COMPANY, a corporation duly organized under the laws of the State of Connecticut, and having its principal office in the City of Hartford, County of Hartford, State of Connecticut, does hereby make, constitute and appoint

ARTHUR A. NOLL and/or DONALD CLEVELAND,
of CHICAGO, ILLINOIS,

its true and lawful Attorney(s)-in-fact, with full power and authority to each of said Attorney(s)-in-fact, in their separate capacity if more than one is named above, to sign, execute and acknowledge any and all bonds and undertakings and other writings obligatory in the nature thereof on behalf of the company in its business of guaranteeing the fidelity of persons holding places of public or private trust; guaranteeing the performance of contracts other than insurance contracts; guaranteeing the performance of insurance contracts where surety bonds are accepted by states and municipalities, and executing or guaranteeing bonds and undertakings required or permitted in all actions or proceedings or by law allowed,

in penalties not exceeding the sum of FIVE HUNDRED THOUSAND DOLLARS

($500,000.00) each,

and to bind the HARTFORD ACCIDENT AND INDEMNITY COMPANY thereby as fully and to the same extent as if such bonds and undertakings and other writings obligatory in the nature thereof were signed by an Executive Officer of the HARTFORD ACCIDENT AND INDEMNITY COMPANY and sealed and attested by one other of such officers, and hereby ratifies and confirms all that its said Attorney(s)-in-fact may do in pursuance hereof.

This power of attorney is granted under and by authority of the following By-Law adopted by the Stockholders of the HARTFORD ACCIDENT AND INDEMNITY COMPANY at a meeting duly called and held on the 10th day of February, 1943.

ARTICLE IV

SECTION 8. The President or any Vice-President, acting with any Secretary or Assistant Secretary, shall have power and authority to appoint, for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, one or more Resident Vice-Presidents, Resident Assistant Secretaries and Attorneys-in-fact and at any time to remove any such Resident Vice-President, Resident Assistant Secretary or Attorney-in-fact and revoke the power and authority given to him.

SECTION 11. Attorneys-in-fact shall have power and authority, subject to the terms and limitations of the power of attorney issued to them, to execute and deliver on behalf of the Company and to attach the seal of the Company thereto any and all bonds and undertakings, and other writings obligatory in the nature thereof, and any such instrument executed by any such Attorney-in-fact shall be as binding upon the Company as if signed by an Executive Officer and sealed and attested by one other of such Officers.

This power of attorney is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Directors of the HARTFORD ACCIDENT AND INDEMNITY COMPANY at a meeting duly called and held on the 13th day of March, 1956.

RESOLVED, that whereas the President or any Vice-President, acting with any Secretary or Assistant Secretary, has the power and authority

STATE OF ILLINOIS, }
COUNTY OF COOK, } ss.

On this 28th day of February, 1966, before me, a notary public, within and for said County and State, personally appeared Donald Cleveland to me personally known, who being duly sworn, upon oath did say that he is the Attorney-in-fact of and for the HARTFORD ACCIDENT AND INDEMNITY COMPANY, a corporation of Hartford, Connecticut, created, organized and existing under and by virtue of the laws of the State of Connecticut; that the corporate seal affixed to the foregoing within instrument is the seal of the said Company; that the seal was affixed and the said instrument was executed by authority of its Board of Directors; and the said Donald Cleveland did acknowledge that he executed the said instrument as the free act and deed of said Company.

Notary Public, Cook County.

My Commission Expires Nov. 20, 1968

Form S-1334 Printed in U.S.A.

thereto by like order.

STATE OF CONNECTICUT, }
COUNTY OF HARTFORD, } ss.

Notary Public
My commission expires March 31, 1967

CERTIFICATE

I, the undersigned, Assistant Secretary of the HARTFORD ACCIDENT AND INDEMNITY COMPANY, a Connecticut Corporation, DO HEREBY CERTIFY that the foregoing and attached POWER OF ATTORNEY remains in full force and has not been revoked; and furthermore, that Article IV, Sections 8 and 11, of the By-Laws of the Company, and the Resolution of the Board of Directors, set forth in the Power of Attorney, is now in force.

Signed and sealed at the City of Hartford. Dated the 28th day of February 1966

W K Boyer Jr.

Assistant Secretary

Form 5-1334 Printed in U.S.A. 2-64

ST. LOUIS POST-DISPATCH
Monday, January 30, 1967

NOTICE OF SALE OF CERTAIN RESIDUES OF URANIUM-BEARING MATERIALS

By virtue of default in the payment of [illegible] due on certain notes of Continental Mineral Processing Company (the debtor) held by Commercial Discount Corporation (the creditor), certain personal property of the debtor described below in which the creditor has a security interest will be sold by the undersigned as agent for the creditor under that certain Loan and Security Agreement executed by the debtor on December [illegible], 1965, a financing statement with respect to which was filed with the Secretary of State of Missouri on February 7, 1966 and with the Recorder of Deeds of the County of St. Louis, Missouri on February 7, 1966. Said sale will be made in connection with the sale of certain real property at 9200 Latty Avenue, Hazelwood, Missouri which is to be made by the undersigned as Trustee under certain deeds of trust covering said Latty Avenue property, which said deeds of trust are recorded in Book 5914, Page 33, and Book 6061, Page 533, in the office of the Recorder of Deeds for the County of St. Louis, Missouri. The undersigned will, on February 2, 1967, commencing at the hour of 12 o'clock noon, at the north front door of the Court House in Clayton, St. Louis County, Missouri, sell said properties at public venuue to the highest bidder for cash. The personal property to be sold is located at 9200 Latty Avenue, Hazelwood, Missouri, and is generally described as follows:

All of the residues of uranium-bearing materials located at the above described premises on the date of sale and said to have been accumulated by the Atomic Energy Commission during its uranium refining activities at its Destrehan Street Plant, St. Louis, Missouri. Although not warranted by the Commission in its sale to the debtor on or about February 9, 1966, and while the secured party does not warrant nor represent the accuracy thereof, the accumulated residues are believed to contain approximately the following quantities of material:

Pitchblende Raffinate	74,000 Tons
Colorado Raffinate	32,500 Tons
Barium Sulfate Cake	1,500 Tons
Barium Cake	8,700 Tons
Miscellaneous Residues	350 Tons

(Note: Engineering survey of said accumulated residues made June 23, 1956 by Stolwyk, McDaniel, Ferrenbach, Inc., St. Louis, Missouri indicated the following tonnages:

Pitchblende Raffinate	85,353 Tons
Colorado Raffinate	36,196 Tons
Barium Sulfate Cake	5,016 Tons
C-Slag.	6,302 Tons)

The Colorado School of Mines Research Foundation, Inc., Golden, Colorado in the summer and fall of 1966 conducted a research project (#100421) with respect to the above materials to establish the most feasible method of processing the ore residues and to determine the amounts of economically recoverable items from the above materials.

Provided that recovery processes recommended by the final written report, dated January 9, 1967, of such research by Colorado School of Mines Research Foundation, Inc. are employed it is the opinion of that foundation that, based on the quantities of material sold by the Atomic Energy Commission to the debtor as set forth above, the following approximate amounts of chemical elements and metallic chemical elements may be feasibly recovered from the materials:

U_3O_8	576,700 Pounds
Cu.	947,414 Pounds
Ni.	3,380,650 Pounds
Co.	2,726,980 Pounds
Se.	100,000 Pounds

The reports of the Colorado School of Mines Research Foundation, Inc., and other information pertaining to the property being offered for sale, may be inspected prior to sale and during business hours at the offices of Commercial Discount Corporation, Room 300, 105 West Adams Street, Chicago, Illinois, where further information concerning the terms of sale and the foregoing collateral may be obtained. Neither Joseph W. Lewis, individually or as successor trustee or agent or Commercial Discount Corporation make any warranties or representations of any kind, express or implied, with respect to the personal and real property described above, or with respect to any reports, opinions, or other data pertaining thereto.

JOSEPH W. LEWIS, Successor Trustee and Agent.