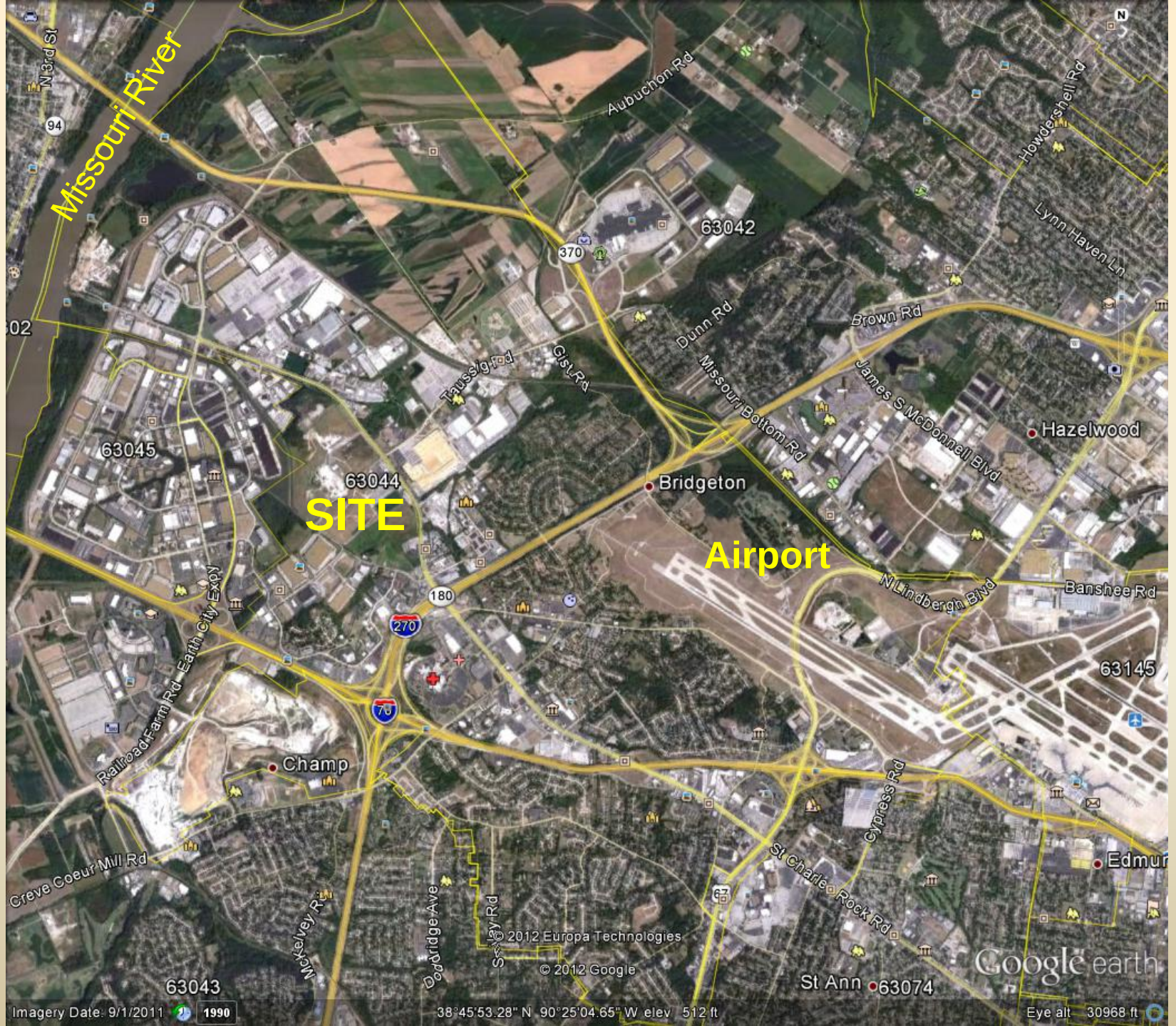
The West Lake Landfill OU-1 ROD Amendment

Dan Gravatt

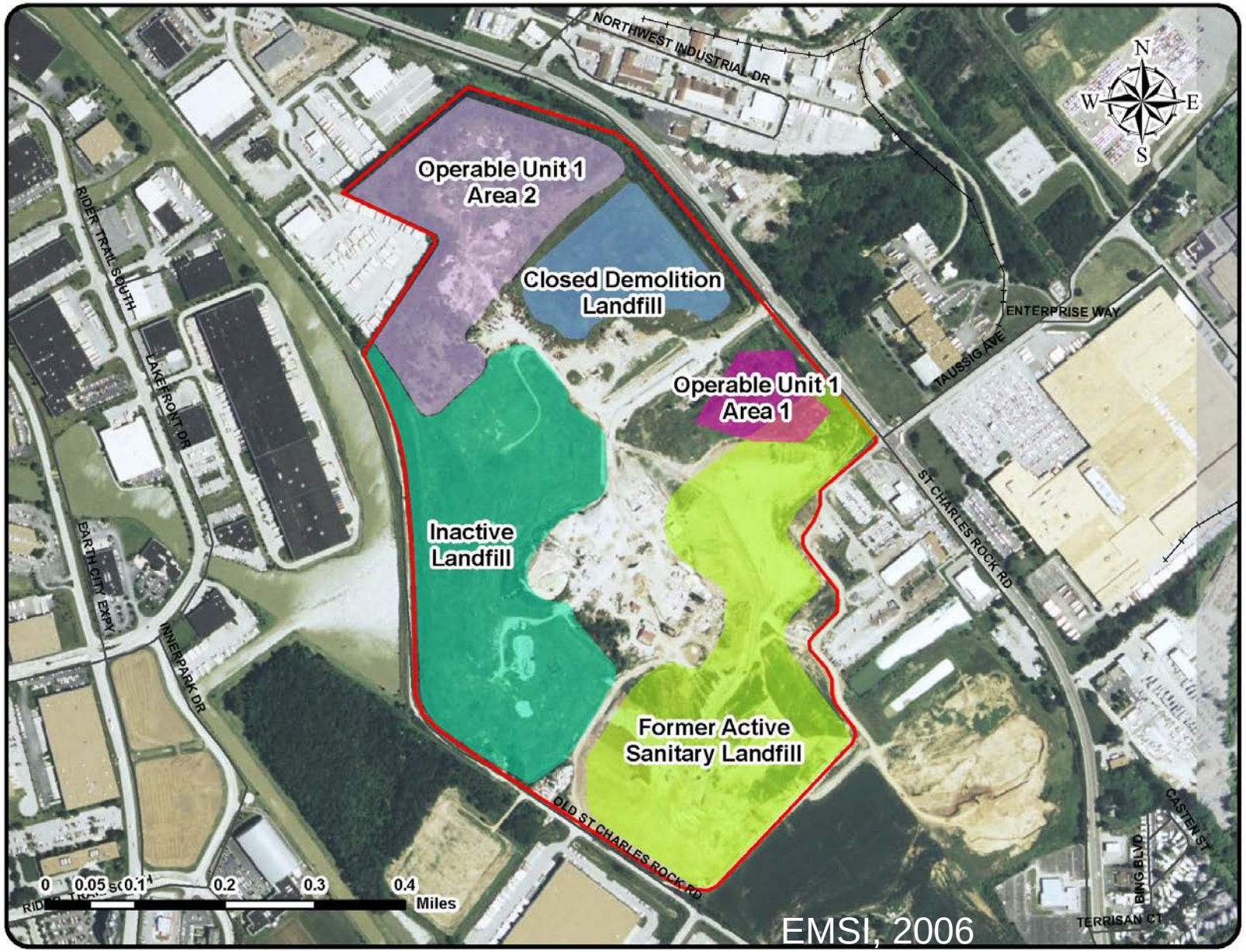
U.S. Environmental Protection Agency

Region 7

30286032

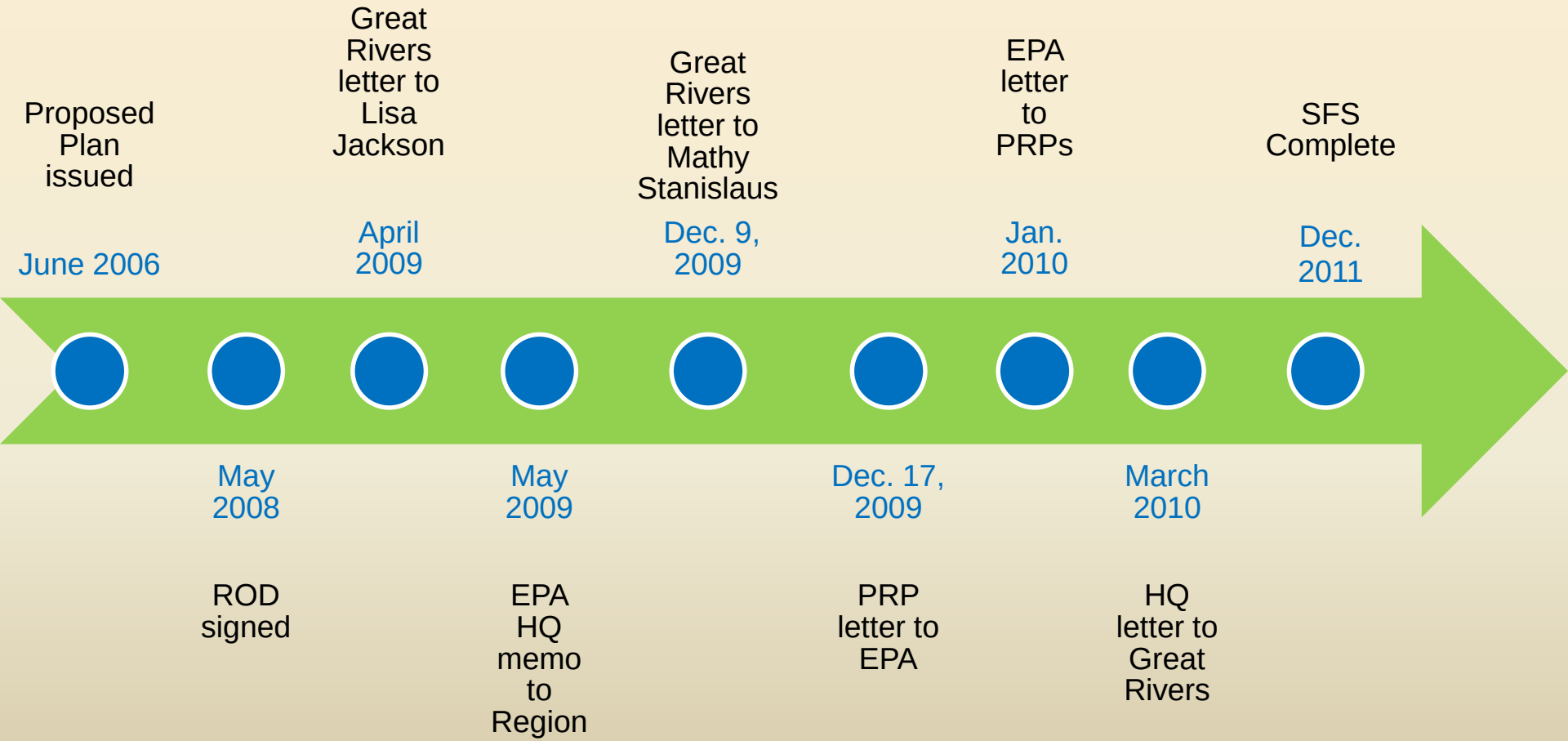

Missouri River
N 3rd St
94
Aubuchon Rd
Howdershell Rd
Lynn Haven Ln
63042
370
Dunn Rd
Brown Rd
Taussig Rd
Gist Rd
Missouri Bottom Rd
James S McDonnell Blvd
Hazelwood
63045
63044
SITE
Bridgeton
Airport
180
270
70
N Lindbergh Blvd
Banshee Rd
63145
Earth City Expy
Champ
Creve Coeur Mill Rd
Cypress Rd
St Charles Rock Rd
Edmun
Dodridge Ave
© 2012 Europa Technologies
© 2012 Google
63043
St Ann
63074
Google earth
Imagery Date: 9/1/2011
1990
38°45'53.28" N 90°25'04.65" W elev 512 ft
Eye alt 30968 ft

Site Boundaries



EMSI, 2006

The road to the ROD Amendment for OU-1



How West Lake Landfill became radiologically contaminated

- Manhattan Project work in St. Louis (Mallinckrodt)
- 8,700 tons leached barium sulfate cake (uranium 0.03% - 0.1%) left over after other, more valuable ore residues sent to Colorado for reprocessing
- Uranium concentrations and leach potential too low for commercial reprocessing
- Mixed with 39,000 tons of soil
- Given to the municipal solid waste (MSW) landfill and used as daily and intermediate cover at OU-1 Areas 1 and 2
- Contaminated soil was placed between July and October 1973

Site Areas – Operable Unit 1

- Radiological Areas 1 and 2 received municipal solid waste, construction and demolition debris, and industrial wastes
- Operated from approximately 1950 to 1974
- Buffer Zone/Crossroad Property (Ford Property) became radiologically contaminated by erosion from Area 2

- Areas 1 (10 acres) and 2 (30 acres) are part of the overall 200-acre MSW landfill

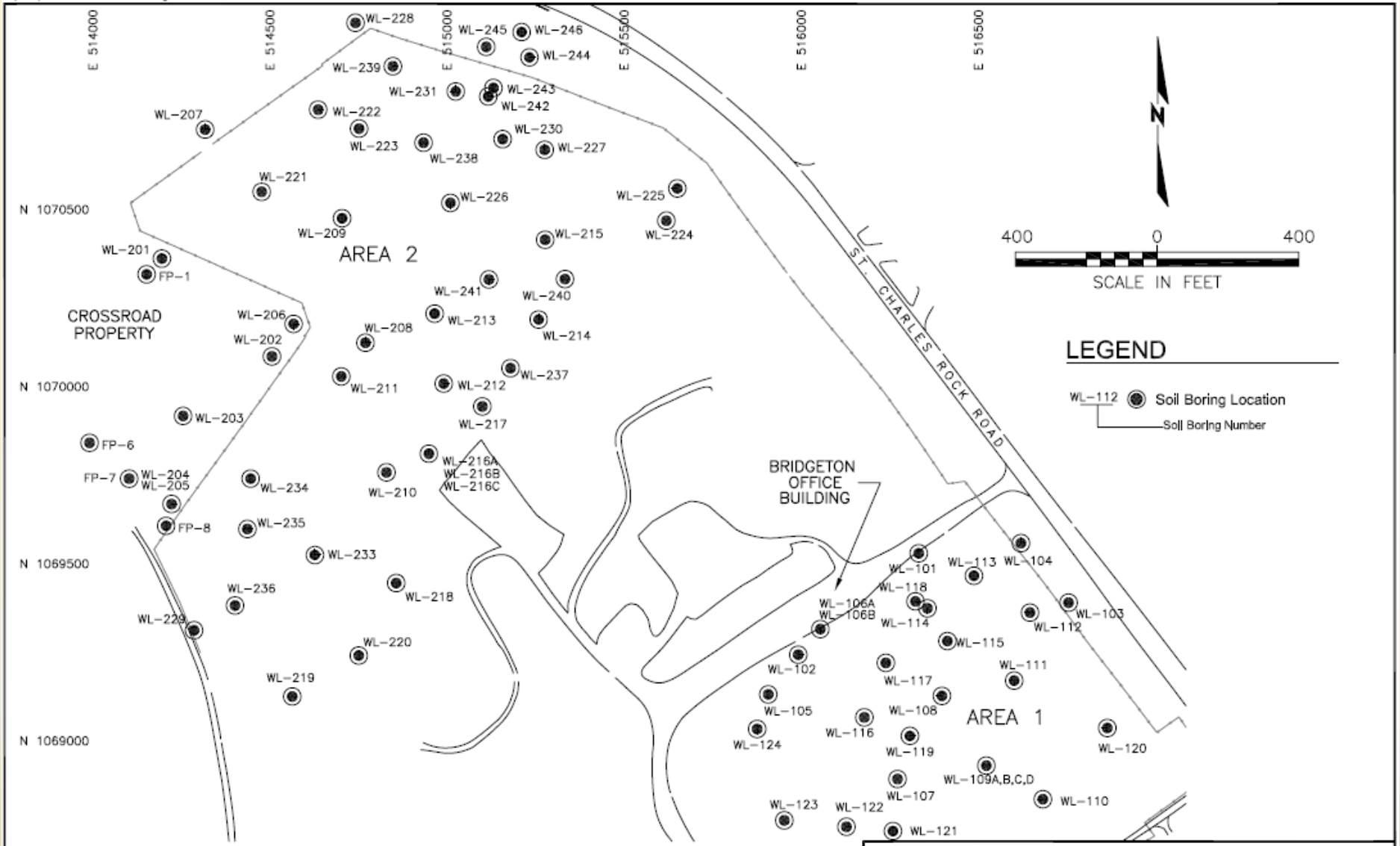


Figure 4-9
Area 1 and 2
Soil Boring Locations
West Lake Landfill OU-1 Remedial Investigation Report

EMSI Engineering Management Support, Inc.

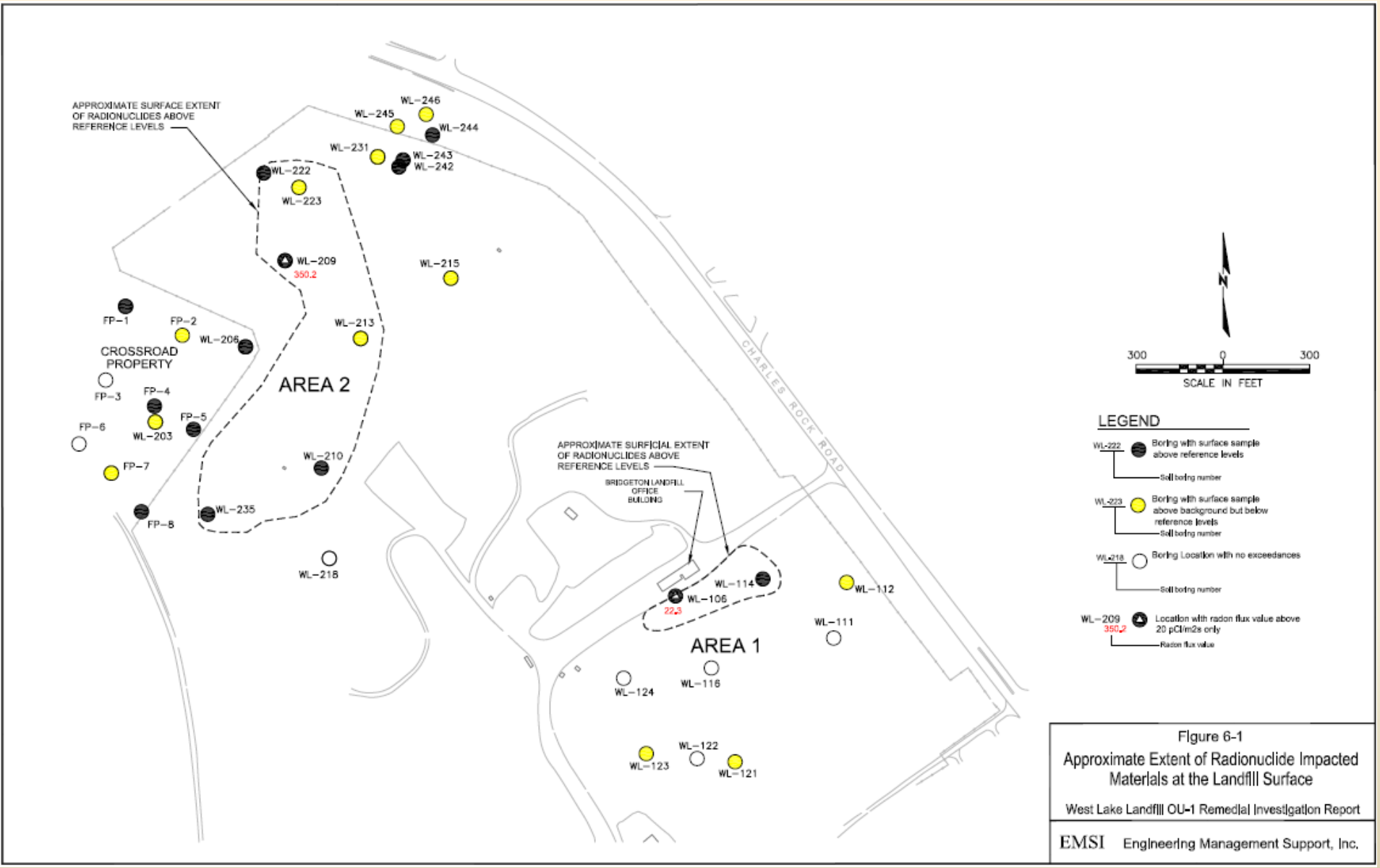


Figure 6-1

Approximate Extent of Radionuclide Impacted Materials at the Landfill Surface

West Lake Landfill OU-1 Remedial Investigation Report

EMSI Engineering Management Support, Inc.

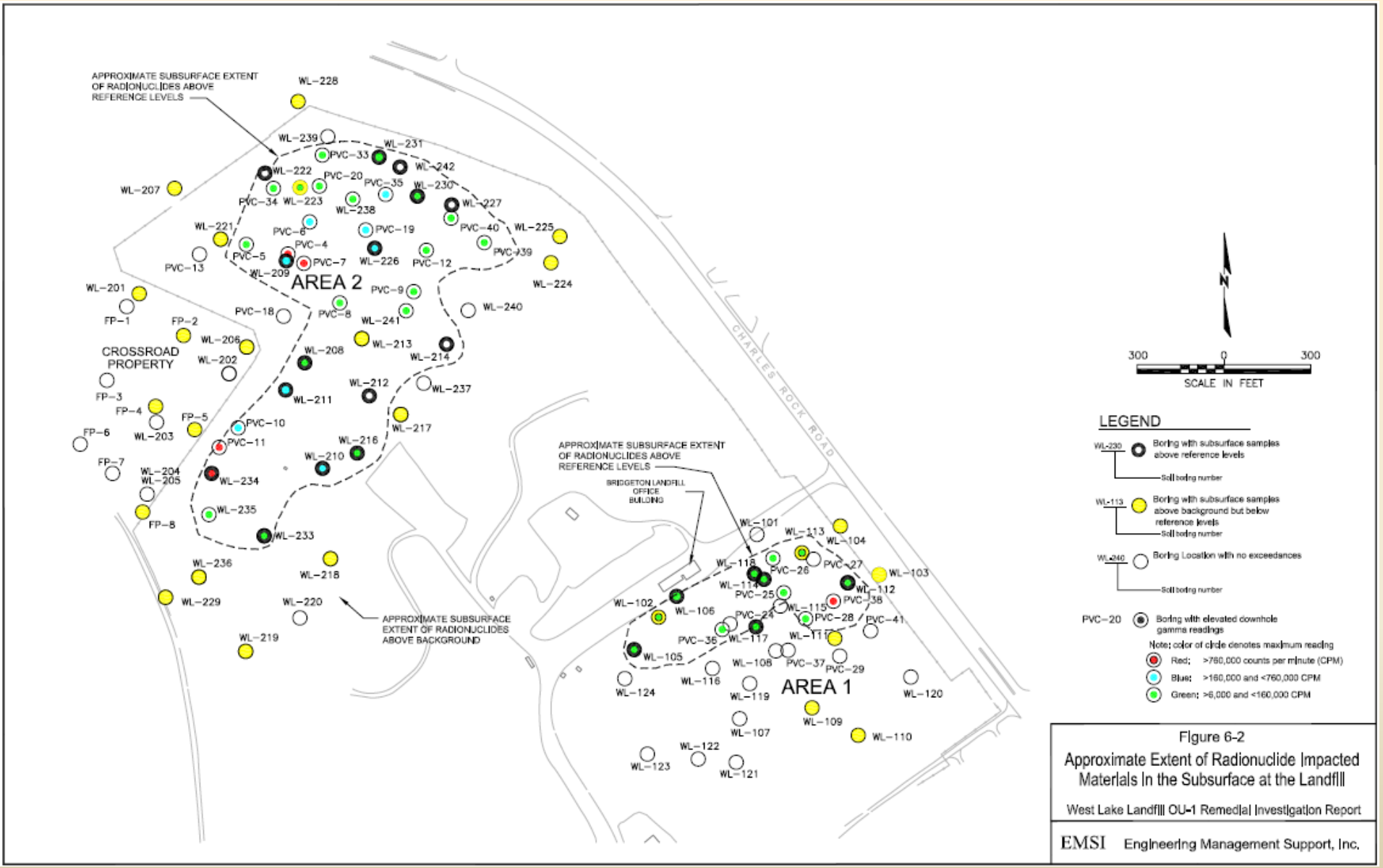


Figure 6-2

Approximate Extent of Radionuclide Impacted Materials In the Subsurface at the Landfill

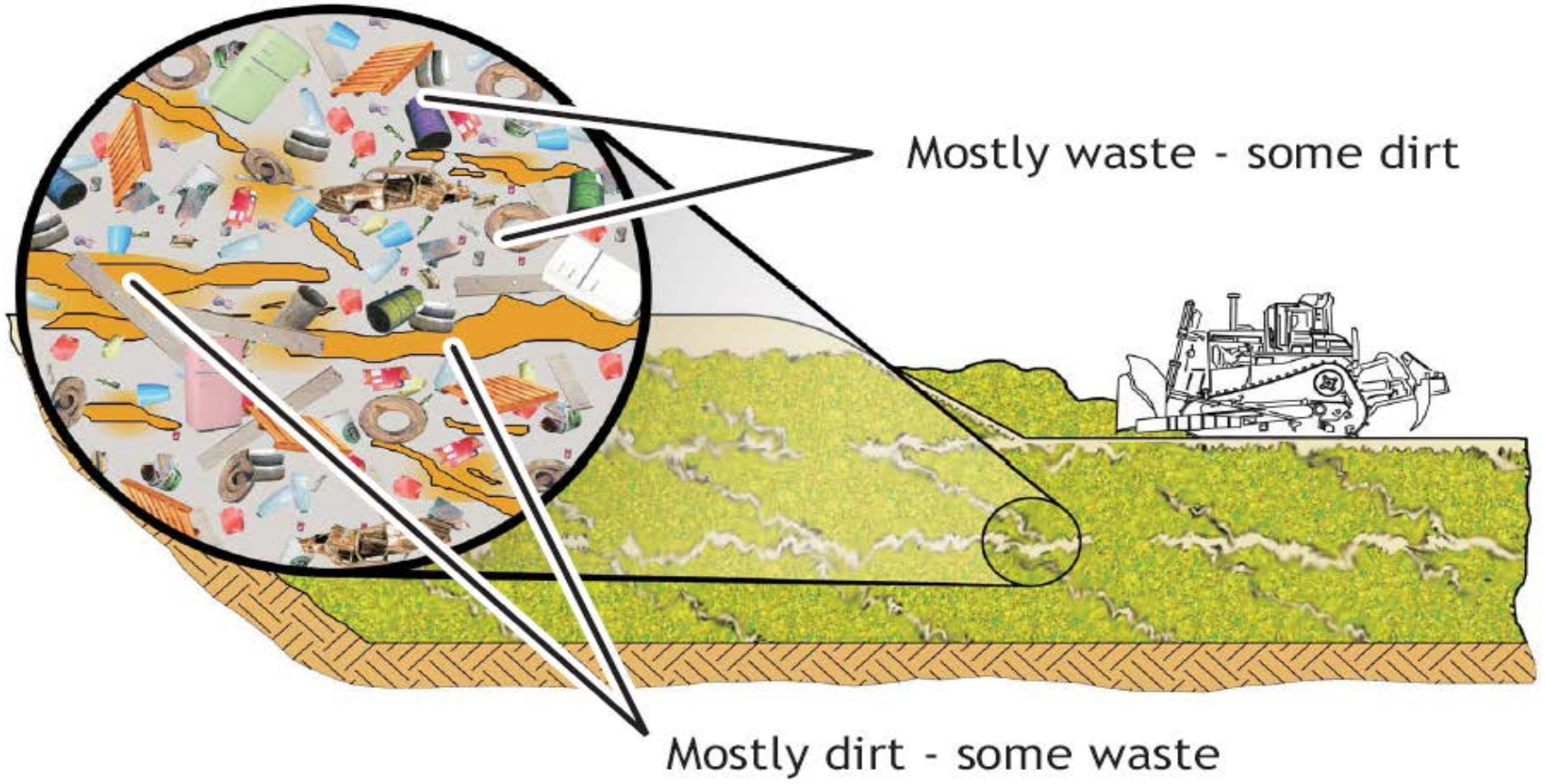
West Lake Landfill OU-1 Remedial Investigation Report

EMSI Engineering Management Support, Inc.

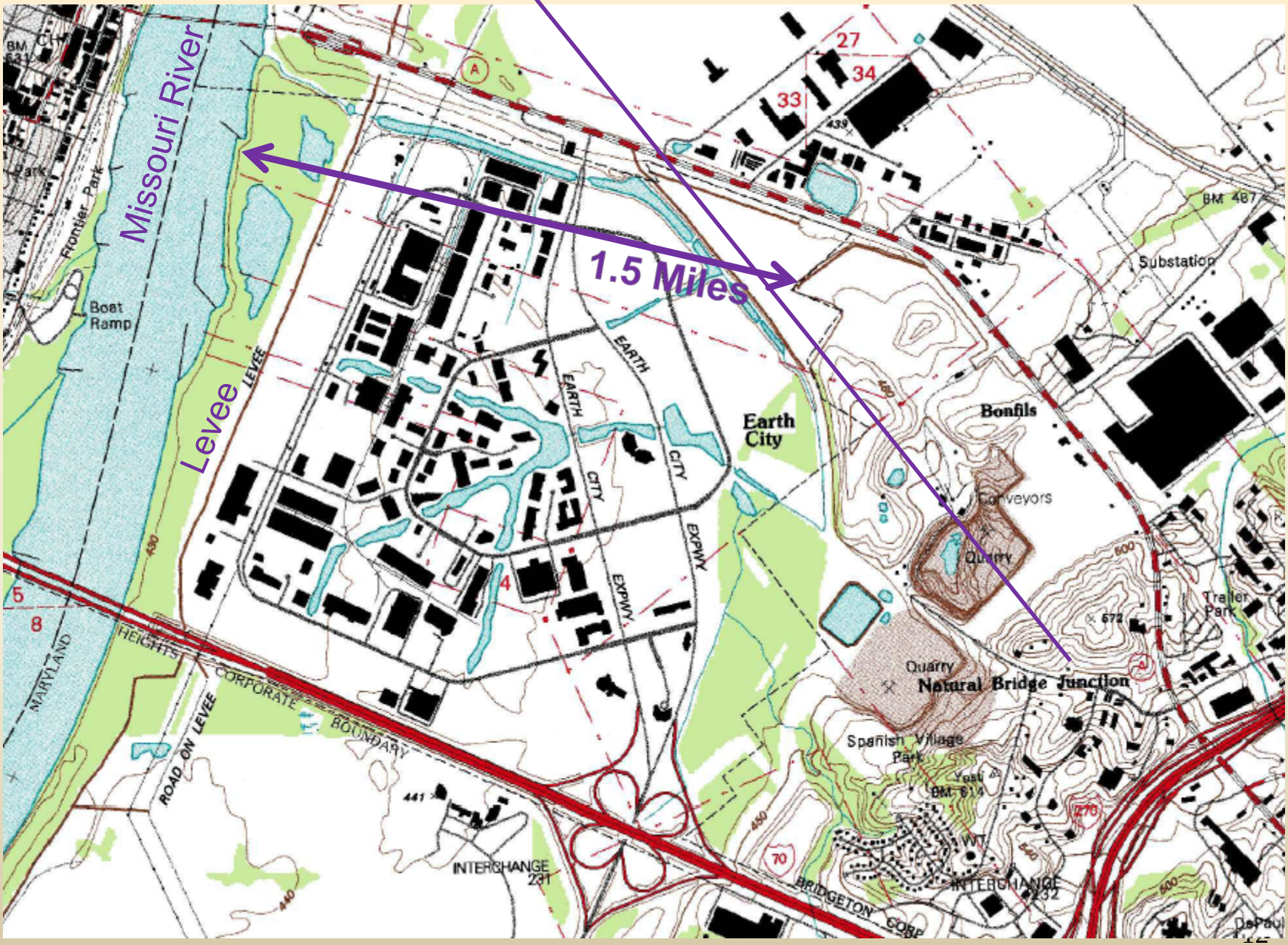
Distribution of Rads within MSW

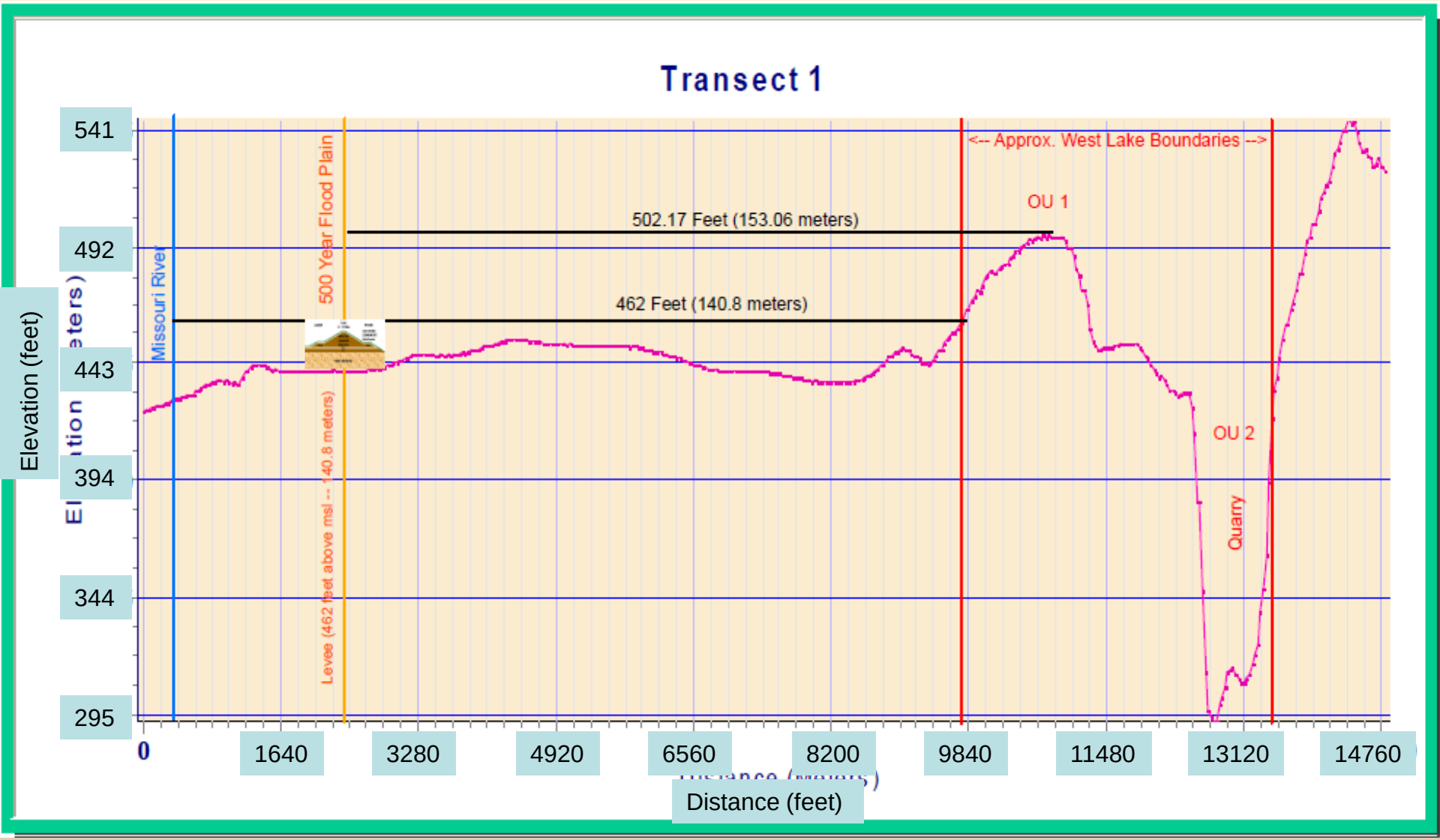
- NRC survey (1982) found rads from 0-20 feet deep, generally from 2-15 feet thick. 43 holes were drilled.
- RI (2000) found rads from 0-17 feet in Area 1, 0-31 feet in Area 2, and some isolated occurrences as deep as 49.5 feet. 74 holes were drilled, to greater depths than NRC holes.
- RI included more lab analyses of soil, and more analytes, than NRC survey.

TYPICAL MIXING OF WASTE AND DIRT IN LANDFILL



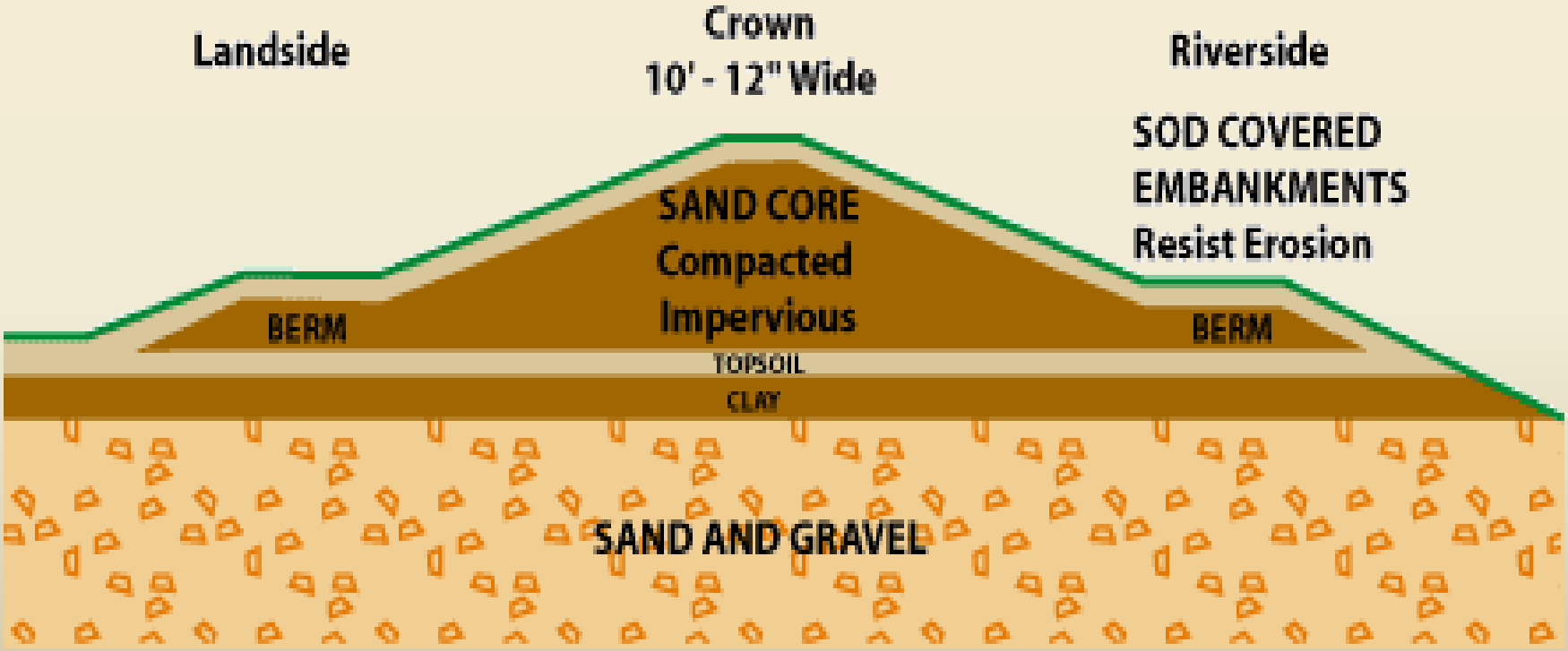
Transect 1


Missouri River
Levee
1.5 Miles
Earth City
Bonfils
Natural Bridge Junction
Boat Ramp
Frontier Park
Substation
Quarry
Trailer Park
Spanish Village Park
INTERCHANGE 231
INTERCHANGE 232
MARYLAND HEIGHTS
CORPORATE BOUNDARY
ROAD ON LEVEE
BRIDGETON CORP
EARTH CITY EXPWY
LEVEE
27
34
33
BM 487
BM 614
70


Transect 1
541
492
443
394
344
295
Elevation (feet)
Missouri River
500 Year Flood Plain
Levee (462 feet above msl -- 140.8 meters)
502.17 Feet (153.06 meters)
462 Feet (140.8 meters)
<-- Approx. West Lake Boundaries -->
OU 1
OU 2
Quarry
0
1640
3280
4920
6560
8200
9840
11480
13120
14760
Distance (feet)

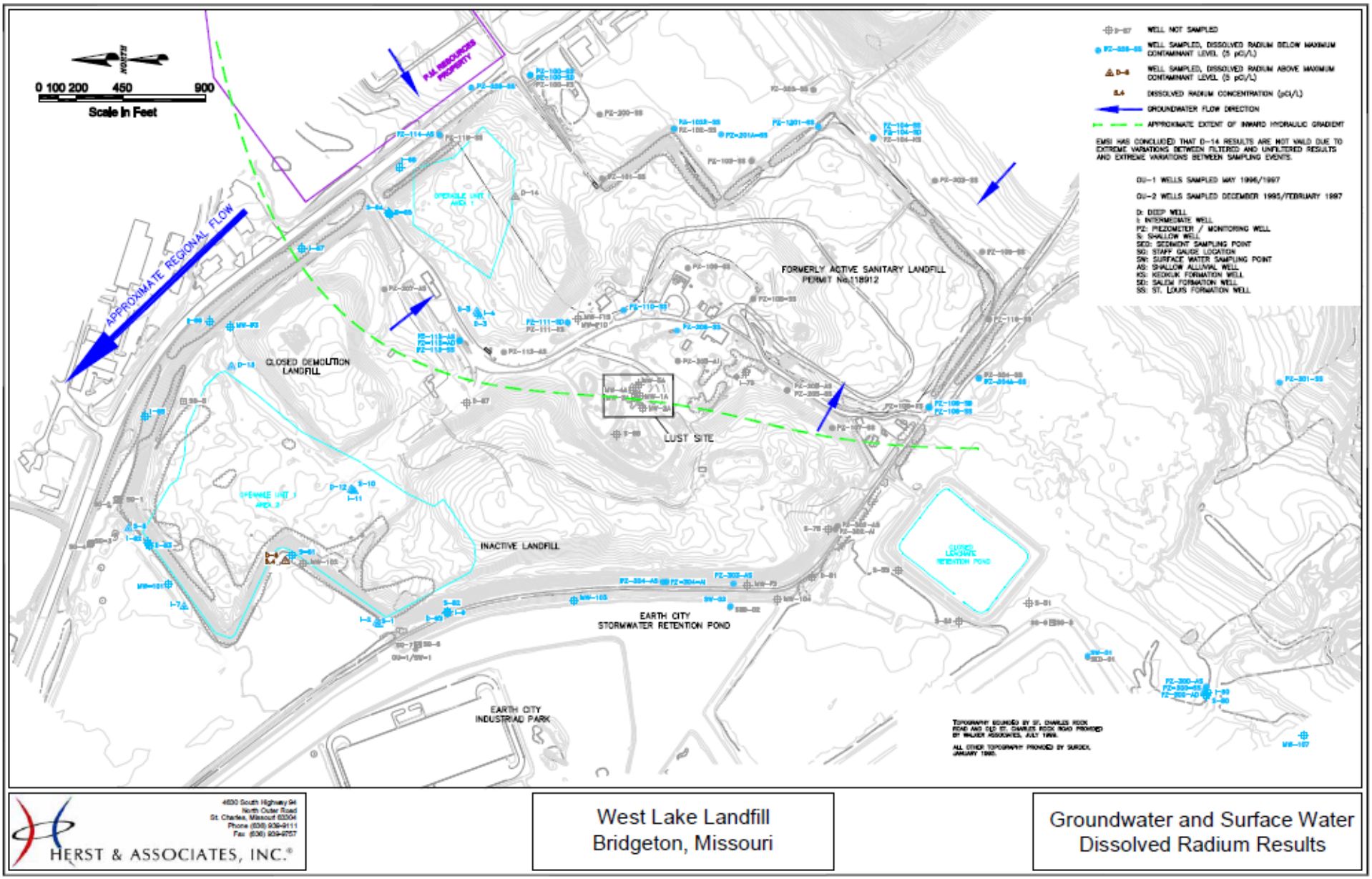
Three Lines of Defense for OU1:

- The levee has never been breached or overtopped; the levee district's mission is protecting the $1B industrial park
- Rock armoring of toe of Area 2 cap in case levee fails in the future
- Landfills flooded during Hurricane Katrina suffered little damage



Groundwater at the Site

- 44 monitoring wells installed in and around the site during the RI
- No plumes of radioisotopes or other contaminants identified during the RI (60 borings installed)
- Isolated detections of radium, arsenic, lead (unfiltered), benzene and chlorobenzene above their respective MCLs



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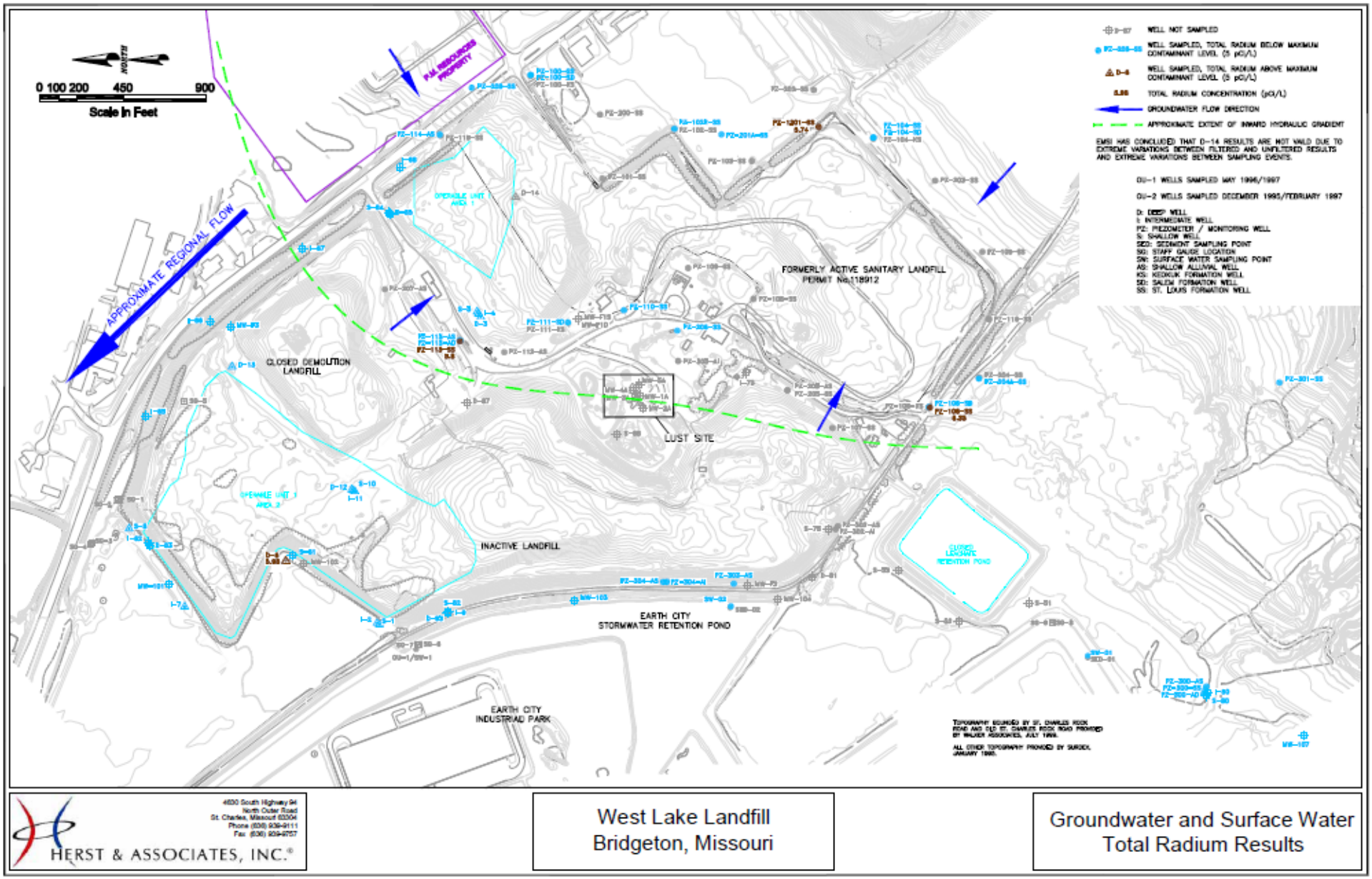
West Lake Landfill
Bridgeton, Missouri

Groundwater and Surface Water
Dissolved Radium Results



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Groundwater and Surface Water
Total Radium Results

Human Health Risk Summary

Evaluation Criteria	ROD-Selected Remedy	"Complete Rad Removal" with Off-site Disposal	"Complete Rad Removal" With On-site Disposal
Primary Balancing Criteria			
Long-Term Effectiveness and Permanence			
Magnitude of residual risks	Highest long-term risk that would remain upon completion of the remedial action (1.3×10^{-5}) is within EPA's target risk range of 1×10^{-6} to 1×10^{-4}.	Highest long-term risk that would remain upon completion of the remedial action ($<1 \times 10^{-7}$) is less than EPA's target risk range of 1×10^{-6} to 1×10^{-4}.	Highest long-term risk that would remain upon completion of the remedial action (1.5×10^{-6}) is within EPA's target risk range of 1×10^{-6} to 1×10^{-4}.
Short-Term Effectiveness			
Protection of the community during any remedial action	Lowest potential for impacts to the community: Transportation accident incidence:0.61 Carcinogenic risk to residents:3.3×10^{-6} Carbon dioxide emissions: 8,350 tons	Highest potential for impacts to the community: Transportation accident incidence:1.4 Carcinogenic risk to residents:2.1×10^{-5} Carbon dioxide emissions: 35,400 tons	Lower potential for impacts to the community: Transportation accident incidence:0.79 Carcinogenic risk to residents:2.0×10^{-5} Carbon dioxide emissions: 17,900 tons
		Excavation of RIM would create depressions in the waste where precipitation could accumulate increasing the potential for infiltration, leaching and creation of a plume of contamination in groundwater.	Excavation of RIM would create depressions in the waste where precipitation could accumulate increasing the potential for infiltration, leaching and creation of a plume of contamination in groundwater.
	This alternative poses the least potential for increased bird strikes to aviation operations at nearby Lambert-St. Louis International Airport.	This alternative poses potential for increased bird strikes to aviation operations at nearby Lambert-St. Louis International Airport.	This alternative poses greatest potential for increased bird strikes to aviation operations at nearby Lambert-St. Louis International Airport.
Protection of workers during remedial actions	Lowest potential for impacts to workers Industrial accident incidence – 4.7 Carcinogenic risk – 7.2×10^{-5} Worker dose (TEDE) – 50 mrem/yr	Greater potential impacts to workers from increased handling of RIM Industrial accident incidence – 7.6 Carcinogenic risk – 7.6×10^{-4} Worker dose (TEDE) – 260 mrem/yr	Greater potential impacts to workers due to increased handling of RIM Industrial accident incidence – 9.0 Carcinogenic risk – 7.4×10^{-4} Worker dose (TEDE) – 260 mrem/yr

Remedial Action Objectives

- Prevent direct contact with landfill contents including exposure to external radiation
- Minimize infiltration and any resulting contaminant leaching to groundwater
- Control surface water runoff and erosion
- Control and treat landfill gas emissions including radon
- Consolidate eroded rad-impacted soil from Buffer Zone into Area 2 cell prior to capping

Remedies evaluated in the SFS

- The SFS re-evaluates the ROD remedy and the complete RIM excavation and off-site disposal remedy *in greater detail* than was done in the original FS
- The SFS also includes an evaluation of complete excavation and on-site disposal of radiologically-contaminated material, at the request of EPA HQ
- No new investigation or sampling

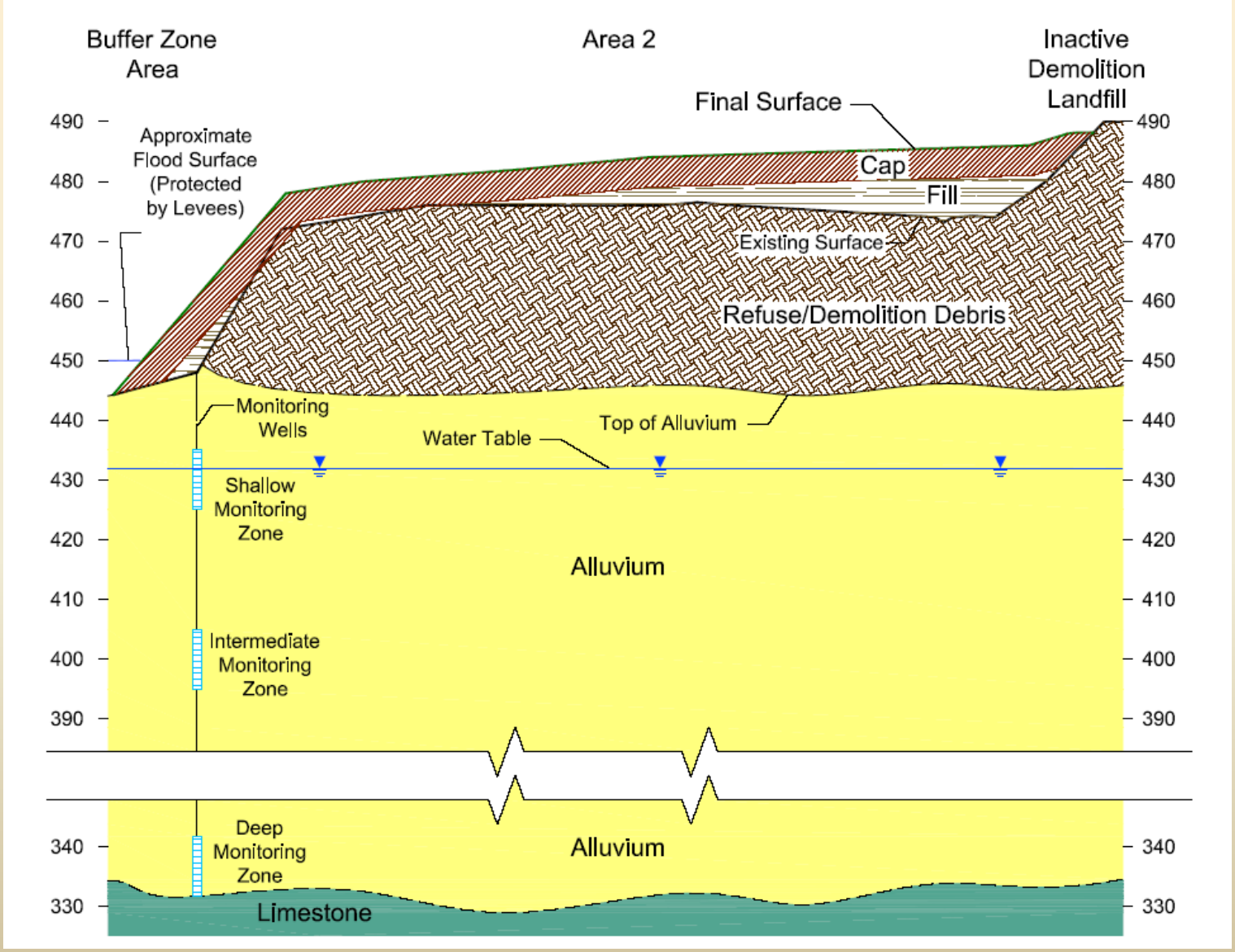
Treatments evaluated in the SFS

- Potential treatment technologies evaluated "under the assumption that PTW is present"
- Used "Technology Reference Guide for Radioactively Contaminated Media" (EPA 402-R-07-004, October 2007)
- No technologies were found to be practicable treatments
- Primary difficulty with treatments is the extreme heterogeneity of the municipal solid waste and soil mixture

Cap-in-Place (ROD Remedy)

- Meets Threshold and most Primary Balancing criteria
- Does not meet preference for treatment
- Is implementable and effective in short term and long term
- Costs $41.4M
- 3 years to complete with unconstrained funding

Cross section of Landfill and Cap



Excavation and Off-Site Disposal Alternative

- Meets Threshold and most Primary Balancing criteria
- Does not meet preference for treatment
- Is effective in the long term
- Issues with short-term effectiveness
- Issues with implementability
- Legal issues (STLAA covenant, MOU with FAA)
- Costs $259M to $415M
- 4 years to complete with unconstrained funding
- 22-38 years to complete if Fund-lead ($10M/yr), assuming PRPs cash out for $41M cost of ROD remedy.

Implementability: Transporting Waste from Landfill to Railcar

- Amount of hazardous fill to move = 500,000 cubic yards
- Number of truckloads from West Lake Landfill to railhead = 17,000
- Number of Truck miles = 345,000
- Estimated number of accidents = 1.4

*Assuming 3.8 accidents/1,000,000 truck miles, based on DOT data

Implementability: Additional Risk with Transporting Waste on Rail to Utah

- Number of railcars to transport waste from St. Louis to Clive Disposal Facility =

  5,000 railcars
- Assume 100 railcars/trainload = 50 trains
- Train miles = 115,000
- Risk of injury or death = 0.3
- Rail lines go through several large cities with EJ communities

Excavation and On-site Disposal Alternative

- Does not meet all Threshold criteria
- Meets most Primary Balancing criteria
- Does not meet preference for treatment
- Is effective in the long term
- Issues with short-term effectiveness
- Issues with implementability
- Legal issues (STLAA covenant, MOU with FAA)
- Costs $137M
- 6 years to complete with unconstrained funding
- 10 years to complete if Fund-lead ($10M/yr), assuming PRPs cash out for $41M cost of ROD remedy.

Source: Google Earth

0 1600

SCALE IN FEET

N

Figure 6

Setback From Airport Runway

West Lake Landfill OU-1 Supplemental Feasibility Study

EMSI Engineering Management Support, Inc.

Implementation Issues

- Noise, dust and vapor exposure for nearby residents and businesses
- Bird strike mitigation for aircraft
- Contaminant migration concerns
- Waste hauling/transportation issues
- Schedule and cost considerations
- Airport easement and FAA MOU
- Potential litigation

Reuse Issues

- Regardless of remedy selected, site will be a landfill for the foreseeable future; thus there is no intended reuse of the site
- Negative easement and zoning (both for site and Airport) prevent additional residences around the site
- Risks for future on- and off-site receptors after construction completion are within or below target risk range for all three alternatives

Summary of Alternatives

	Cap-in-Place	Excavation and Off-site Disposal	Excavation and On-site Disposal
Threshold Criteria	✓	✓	Does not meet all ARARs
Balancing Criteria	✓	Short-term effectiveness and implementability issues	Short-term effectiveness and implementability issues
Time to Complete (Unconstrained)	Three years	Four years	Six years
Time to Complete (Fund-Lead)	Five years	22-38 years	Ten years
Cost	$41.4M	$259M to $415M	$137M

Note: None of the three remedies satisfy the preference for treatment.

Preferred Alternative

- SFS analysis re-affirmed ROD remedy as the best alternative, with HQ-specified enhancements to the cap

- Growth in costs ($22.4M for L4 and F4 in ROD; $41.4M for cap-in-place in SFS) results primarily from a much more detailed analysis of the work required; it is **not** due to large changes in the remedy

January, 2012 HQ Briefing

- OSWER AA and other staff in attendance

- Decision was made to take the Region's preferred remedy before the National Remedy Review Board, since **all** alternatives exceed the cost threshold triggering NRRB review

Community Acceptance

- Great Rivers opposes the ROD remedy, wants excavation with off-site disposal
- Some members of public are on the record supporting the ROD remedy
- St. Louis Airport Authority opposes both excavation remedies
- St. Louis Aldermen passed a December 2009 resolution calling for excavation with off-site disposal (however, site is in Bridgeton, MO)
- Water utility does not oppose ROD remedy

State Involvement

- State concurred on the ROD in 2008
- State letter to EPA dated May 4, 2009 suggesting use of ARRA funds to remove radiological contamination from the site and thereby create jobs
- State (Missouri DNR) has been fully involved in preparation of SFS work plan and SFS report from the beginning

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