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September 4, 2001

775575-ITCPR-0370

U.S. Army Engineer District, St. Louis  
Corps of Engineers SLDS Project Office  
ATTN: Mr. Gerald Allen  
1 Foot of Angelrodt  
St. Louis, MO. 63147

RE: Revision to Preferential Pathway Analysis of Plant 1, Area 1 West, St. Louis Downtown Site TERC NO. DACW41-98-D9006 Task Order 0002.

Dear Mr. Allen:

A preferential pathway is defined by the U.S. Army Corps of Engineers (USACE) St. Louis District as a change in soil lithology, any partially buried structures, piping, or other subsurface debris that may allow transport of radiological contaminants along or to more permeable units (sands and gravels). On August 15, 2001, the Plant 1, Area 1 West excavation was remapped for potential preferential pathways. This remapping was necessary because additional excavation was necessary subsequent to the first mapping. Additional excavation was necessary because the preferential pathway sample SLD 26668 and SLD 26670 collected on July 26, 2001 did not meet the required remediation goals.

#### **Lithological Description**

The Area 1 West excavation is located near the southwest corner of Building 25 in Plant 1. The soil in the Area 1 West excavation consisted of rubble and fill, and an olive-gray to dark greenish-gray clay of moderate cohesion. Table 1 lists the general soil unit descriptions for the St. Louis Downtown Site (SLDS). The enclosed figures and photographs illustrate the Area 1 West excavation and associated potential preferential pathways.

**Table 1 - Soil Unit Descriptions for Plant 1 Excavations**

<i>Unit A: Upper Hydrostratigraphic Unit</i>		
<i>Unit</i>	<i>Soil Type</i>	<i>Soil Description</i>
A1	Rubble and Fill	Grayish black to brownish black, cinders, slag, poorly sorted and poor compaction

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A2	Silty Clay (CL)	Olive gray to dark greenish gray, moderate cohesion, medium stiff consistency, moderate plasticity.
A3	Fat Clay (CH)	Olive gray to dark greenish gray, moderate cohesion, medium stiff consistency, slight to moderate plasticity.
A4	Fill	Brown, silty sand, poorly sorted and poor compaction.

#### Identified Preferential Pathways

The floor and sidewalls of the Area 1 West excavation were mapped and the following 8 potential preferential pathways were identified:

PP1= Concrete / A1 contact	(SLD 26665)
PP2= A1 / A2 contact	(SLD 26666)
PP3= A2 / Concrete area #1 contact	(SLD 26667)
PP4= A2 / Concrete area #2 contact	(SLD 26668 and SLD 27020)
PP5= A1 / Concrete wall contact	(SLD 26669)
PP6= A2 / Concrete wall contact	(SLD 26670 and HTZ 25732)
PP7= A2 / Pipe 1 contact	(SLD 26671)
PP8= A2 / Pipe 2 contact	(SLD 27541)

PP4 and PP6 were resampled after further excavation to remove contamination from those areas.

#### Radiological Survey/Sampling Data

On July 26, 2001 and August 15, 2001, soil samples were obtained at each of the preferential pathways listed above and the data are provided in Table 2. The sampling locations for the preferential pathways are shown on Attachment 1.

**Table 2 – Survey/Sampling Data**

<i>Sample ID</i>	<i>Walkover Survey Result (cpm)</i>	<i>Spectral Analysis Result <sup>1</sup> (pCi/g)</i>	<i>Sum of Ratios (SOR)</i>
SLD 26665	15,500	U-238 6.13E+00	0.12
SLD 26666	18,500	Ra-228 4.00E-02 Th-230 6.30E-01 U-238 3.22E+01	0.69
SLD 26667 2	18,000	Ra-228 3.00E-01 Th-230 7.60E-01 Th-232 2.00E-01 U-238 3.24E+01	0.72
SLD 26668 3	18,000	Ra-228 1.90E-01 Th-230 9.10E-01 Th-232 4.80E-01 U-238 5.69E+01	1.23

SLD 27020	18,500	Ra-228 Th-230 Th-232 U-238	1.90E-01 6.90E-01 1.20E-01 3.22E+01	0.70
SLD 26669	16,000	NONE		0.00
SLD 26670 <sub>3</sub>	18,500	Ra-228 Th-232 U-238	2.00E-02 6.30E-01 6.44E+01	1.33
HTZ 25732	14,500	Ra-228 Th-232 U-238	1.20E-01 2.20E-01 3.45E+00	0.08
SLD 26671	18,500	Ra-228 Th-232 U-238	8.00E-02 2.00E-01 1.67E+01	0.35
SLD 27541	18,000	U-238	3.64E+01	0.73

1. Contaminants of concern are not listed in Table 2 if the analytical result was less than the minimum detectable activity.
2. SLD26667 was not identified in the original report, however the results for SLD26667 were included in the original data and identified as the results for SLD26668. Subsequently, the actual results for SLD26668 were not included. All sample numbers and corresponding results are now included in Table 2.
3. SLD26668 was replaced by SLD27020 and SLD26670 was replaced HTZ 25732. Remediation was performed at each of these sampling locations, and therefore the replacement samples most accurately reflect the final radiological condition.

### Summary of Findings

In the Plant 1, Area 1 West excavation, eight potential preferential pathways were identified. Five of these potential preferential pathways are located where the soil interfaces the concrete, an additional potential preferential pathway is identified where the soil lithology changes, and the remaining two potential preferential pathways are located where horizontal pipes traverse the excavation. An assessment of each potential preferential pathway determined that each pathway could facilitate contaminant migration. A soil sample was collected at each potential preferential pathway location. The eight potential preferential pathways are depicted on the enclosed excavation sketches along with their associated sample locations. After reviewing the results of these samples, it was determined that the soils surrounding each of the eight potential preferential pathways achieved remedial goals. Based on the aforementioned pathway sample results, it has been determined that the eight potential preferential pathways identified in Area 1 West have not facilitated contaminant migration through the excavated surface.

This preferential pathway analysis has been reviewed by John Howard, a Missouri Registered Geologist.

If you have any questions or comments please contact me at (314) 291-2246.

Sincerely,

John Eberlin  
Project Manager

Enclosures

Cc: Dave Mueller - USACE  
Dennis Chambers - USACE  
Greg Hempen - USACE  
Debbie McKinley - USACE  
Mark Peterson - SAIC  
Gerry Rood - IT  
Project Files

**AR-052**