Remedial Action Summary (RAS) Information

for Post Remedial Action Report (PRAR)

Norfolk Southern Railroad Vicinity Property (DT-3)

February 27, 2008

REMEDIATION ACTIVITIES

The Norfolk Southern Railroad Vicinity Property (DT-3) is located along North Second Avenue and the railroad track between Destrehan Street to the north and Dock Street to the south and covers approximately 3.5 acres as shown on Figure 1. DT-3 is railroad right-of way property and is divided into three tracts: Tract 1 located between Destrehan and Angelrodt Streets; Tract 2 located between Angelrodt and Buchanan Streets; and Tract 3 located between Buchanan and Dock Streets. The track portion of the DT-3 property is inaccessible and includes a 24-foot wide strip along the length of the track. The DT-3 property does not include any permanent structures, but portions of Tracts 2 and 3 are fenced and used for parking and storage. DT-3 is one of the Vicinity Properties included in the St. Louis Downtown Site (SLDS).

The remediation requirements for DT-3 were identified in the *Record of Decision for the St. Louis Downtown Site, St. Louis, Missouri* (ROD) (USACE, 1998) and further defined by Shaw in the *Pre-Design Investigation Data Summary Report, Norfolk Southern Railroad Vicinity Property (DT-3), SLDS South Vicinity Properties, FUSRAP St. Louis Downtown Site, St. Louis, Missouri* (PDIR) (Shaw, 2007a). The PDIR was the basis for preparing the *Norfolk Southern Railroad Vicinity Property (DT-3) Remediation Activity Work Description* (RAWD) (Shaw, 2007b). The DT-3 remediation took place in October and November 2007 and included removal of about 243 bank cubic yards of contaminated soil from four excavation areas covering about 3,600 square feet of surface area.

CHRONOLOGY OF MAJOR EVENTS

Generally, the sequence of construction activities followed at the excavation areas in DT-3 was as follows:

1. A civil survey of the location, including utilities, building(s), foundation(s), and structure(s) was conducted to document original conditions.
2. Exclusion zone(s), contamination reduction zone(s), and traffic control(s) were established as required.
3. Surface water controls were installed as required.
4. Paving was cut and removed as required. Seven guard posts were removed from the Tract 1 excavation area (Figure 2).
5. Contaminated soils were removed and transported to the SLDS soil load-out area. These contaminated soils were then either loaded directly into railcars or stockpiled for future load-out and transportation to the final disposal facility.
6. Gamma walkover surveys and soil sampling at biased locations within the excavations were performed by Radiation Protection Technicians to guide the excavation. These activities were conducted to identify areas of elevated radiological

activity, locations of contaminated soil, and to identify when the ROD (USACE, 1998) criteria had been met and no further excavation was required.

7. If the biased samples indicated that the ROD remediation criteria were not met and additional excavation was required, steps 5 and 6 were repeated until the excavation was ready for final status survey sampling.
8. If the ROD remediation criteria were not met and the volume of contaminated soil was inaccessible for remediation because it was located adjacent to or beneath permanent structures (e.g., railroad tracks, streets, buildings or support for overhead structures), the USACE was consulted and an evaluation was conducted to estimate the average level of residual contamination.
9. After completing the excavation, a civil survey of the excavation limits and contours was performed prior to final status survey sampling. A preferential pathway evaluation was also performed upon completion of each excavation, and this information was provided to the USACE. No preferential pathways were identified, and no preferential pathway sampling was required for the DT-3 excavations.
10. As-built drawings, the most recent results of biased sampling, and additional information about contaminated soil that was inaccessible for remediation, if applicable, was provided to the USACE as a part of a request for final status survey.
11. Following the USACE authorization, a final status survey consisting of a gamma walkover survey and soil sampling at biased locations within the excavation was performed to verify that ROD remediation criteria had been met.
12. If the biased sample results indicated that ROD remediation criteria had not been met and the areas required additional excavation, steps 5 through 11 were repeated.
13. If the biased sample results confirmed that the ROD remediation criteria had been met, the final status survey samples were then collected at locations defined by a systematic grid in accordance with the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) (U.S. Nuclear Regulatory Commission [NRC], et al., 2000).
14. After evaluating the final status survey sample results in accordance with the MARSSIM, the required backfill authorization paperwork was prepared and provided to the USACE for concurrence and approval to backfill the excavation.
15. The exclusion and contamination reduction zone postings were removed, and traffic controls were established as required for the backfilling operation.
16. No utilities were encountered or restored in the excavations, but the seven guard posts were restored in the Tract 1 remediated areas.
17. Backfilling of the excavation proceeded using specified compaction requirements.
18. The surface of the remediated area was restored to its as-found condition.
19. Erosion and safety controls were removed, and the remediated locations were released to the property owner after inspection and approval by the USACE and the property owner.

Approximately 3,600 square feet of surface area were affected by the remediation activities; this area represents only about 2 percent of the total property of DT-3. An estimated 243 bank cubic

yards of contaminated soil were excavated and shipped to an out-of-state licensed disposal facility. A breakdown of the excavation quantities by location along with the excavation and backfill dates is provided in the following table.

Norfolk Southern Railroad Excavation Area No. & Tract No. [1]	Survey Unit No.	Area (square meters)	Bank Volume of Removed Soil (cubic yards)	Date Excavation Started	Date of Backfill Authorization
Areas 1 and 2, Tract 1	SU-1	55	36	October 29, 2007	November 16, 2007
Area 3, Tract 2	SU-1	204	170	October 22, 2007	November 16, 2007
Area 4, Tract 3	SU-1	76	37	October 22, 2007	November 16, 2007
Totals		**335**	**243**		

[1] As depicted on the Gross Excavation Plan of the RAWD (Shaw, 2007b)

Figures 2, 4, and 6 indicate the as-built excavation contours of the remediated areas in Tracts 1, 2, and 3, respectively. Figures 3, 5, and 7 include locations of final status survey samples and the Survey Unit Boundaries for DT-3 Tracts 1, 2, and 3, respectively. The disposal facility used for disposal of the contaminated soils from DT-3 was:

US Ecology Idaho, Inc.
(Formerly Envirosafe of Idaho)
10.5 Miles NW on Hwy 78, Lemely Rd
Grand View, ID 83624

PERFORMANCE STANDARDS AND REMEDIATION QUALITY CONTROL

The DT-3 remedial actions included the following to confirm that the remediation goals were achieved:

1. An evaluation was performed to determine whether a sufficient number of post-remediation samples were collected to perform the Wilcoxen Rank Sum (WRS) statistical test using actual survey unit data.
2. The sum of ratios (SOR) for the net concentration of the contaminants of concern (COCs) as specified in the ROD (USACE, 1998) was calculated for each sample. The ROD identifies radionuclides as the SLDS soil COCs, specifically radium (Ra)-226, Ra-228, thorium (Th)-230, Th-232, uranium (U)-235, and U-238 and their decay products (including actinium-227 and protactinium-231). To document that the ROD remediation goals (RGs) have been achieved, the average SOR must be less than 1.0. The SOR calculations for surface (top 0.5 feet) and subsurface (below 0.5 feet) soils are defined in the ROD.

3. Areas of elevated activity were evaluated against the elevated measurement comparison (EMC) for the respective survey unit. No remediated (i.e., Class 1) area may have an SOR ≥1.0. The concentrations of radionuclides must also achieve RGs when averaged over 100 square meters (m^2) as defined in 40 CFR 192.
4. The WRS statistical test was performed for COCs present in concentrations less than or equal to their respective background concentrations if required. The respective survey unit must pass the WRS statistical test specified in the MARSSIM to demonstrate that the ROD RGs were achieved.
5. The dose and residual risk of the respective survey unit were calculated for comparison to the applicable guidelines established in the *Final Status Survey Plan for Accessible Soil Within Mallinckrodt Property and the Vicinity Properties, Excluding Plants 1, 2, and the City Property at the St. Louis Downtown Site, St. Louis, Missouri* (FSSP) (USACE, 2002). The total dose from residual radioactivity within any survey unit with NRC-licensed materials commingled with Manhattan Engineer District/U.S. Atomic Energy Commission related wastes is limited to the NRC's dose limit of 25 millirems per year (mrem/yr), as defined in 10 CFR 20, Subpart E for any FUSRAP materials similar to licensable materials under the Atomic Energy Act.

Consolidated materials subject to final status survey were evaluated to ensure that surface contamination levels that would result in an exposure that exceeds 25 mrem/yr, for scenarios of current and future unrestricted use, were not exceeded. Administrative limits for contamination on the surfaces of consolidated materials have been adopted from the American National Standards Institute ANSI/HPS N13.12-1999, *Surface and Volume Radioactivity Standards for Clearance* (ANSI, 1999) and limit the Total Effective Dose Equivalent to 1 mrem per year.

INSPECTIONS

The final inspection and release of this property occurred on February 12, 2008. The final inspection is documented on the Final Inspection Form and is retained in the Project Files.

PROJECT COSTS

Actual project costs were about $128,860 including contaminated soil transportation and disposal, project management, and remedial design. The 1998 ROD-estimated costs for this property were $299,860 or $393,850 adjusted to 2007 costs.

A breakdown of the actual project costs is provided below for the Norfolk Southern Railroad Vicinity Property (DT-3):

Site: FUSRAP - SLDS
Description: Remediation of the Norfolk Southern Railroad Vicinity Property (DT-3)
Location: St. Louis, MO
Phase: RAS
Date of Estimate: January 7, 2008

Project Costs

Cost Element	Amount-2007 Dollars
Area Preparation	$ 2,990
Excavation	16,480
Engineering during Construction	1,200
Transportation and Disposal	70,120
Sampling	1,500
Restoration	7,490
RAS Preparation	300
Remedial Design	9,450
Project and Construction Management	19,330
Total RA Cost	**$ 128,860**

OBSERVATIONS AND LESSONS LEARNED

Close coordination with the property owner was required for work within the railroad right-of-way. Work within 25 feet of the centerline of the track normally requires a railroad flagman, but Norfolk Southern Railroad agreed to reroute traffic and only require a temporary derail device on the adjacent track during the work based on the nature of the work and Shaw's close coordination.

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