

MOBILITY IMPACTS OF TRICHLOROETHYLENE ON RADIONUCLIDES IN GROUNDWATER AT THE ST. LOUIS AIRPORT SITE

Summary. Concern was expressed during the second meeting of the groundwater expert panel that trichloroethylene could increase the mobility of radionuclides in groundwater at the St. Louis site. Trichloroethylene (C_2HCl_3) was detected in several shallow wells at the St. Louis airport site and adjacent ballfields. However, no evidence has been found to date that trichloroethylene (TCE), as an organic solvent, would accelerate the transport of radionuclides in groundwater.

Trichloroethylene was detected in 1992 (1400 $\mu\text{g/l}$) and 1993 (1200 $\mu\text{g/l}$) in a monitoring well (B53W17S) on the ballfield just north of McDonnell Boulevard. The well was screened at 6 - 9 m (20 - 30 ft) below grade in the upper groundwater system. In 1989, TCE was also detected in monitoring wells B (110 $\mu\text{g/l}$) and M11-9 (130 $\mu\text{g/l}$) which are located next to each other at the eastern end of SLAPS beside Coldwater Creek. Well M11-9 was screened at 5.9 - 8.9 m (19.3 - 29.3 ft) below grade in the upper aquifer. A small amount of TCE (19 $\mu\text{g/l}$) was detected in 1992 in monitoring well B53W19S south of Banshee Road about 200m (667 ft) southwest of wells B and M11-9. This well was screened at 2.1 - 5.1 m (7 - 17 ft) below grade. Measurements were made for TCE in wells to the west of Coldwater Creek (B53W18S), south of Banshee Road close to Eva Avenue (B53W20S), and at the east end of the ballfield next to Eva Avenue (B53W12D) at various depths. No TCE was detected in these wells. The Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) for TCE is 5 $\mu\text{g/l}$.

TCE is a widely used industrial organic solvent. Solubility in organic solvents, however, is not a characteristic attributed to metal compounds such as the thorium and uranium oxides and hydroxides at the St. Louis site. In order for these compounds to dissolve in TCE, they would first have to react with an organic reagent (like acetic acid, nitrophenol, etc.) to form a neutral covalent compound in which the metal (radionuclide) has become part of the organic structure and is more or less buried inside the molecule, making it only slightly soluble in water but readily soluble in organic solvents. In the current setting, there are no organic constituents present that could effect this conversion, so it is very unlikely that thorium, radium or uranium will dissolve in the TCE and hence be mobilized.

Sources checked

1. Dr. Chester W. Francis, Soil Scientist, Environmental Science Division, Oak Ridge National Laboratory, Oak Ridge, TN.

In a telephone conversation, Dr. Francis said that, to the best of his knowledge, no studies on the mobility impacts of trichloroethylene on radionuclides in groundwater had been done. Dr. Francis said that it is very unlikely that the presence of trichloroethylene could increase the solubility of radionuclides.

2. University of Tennessee Main Library (Hodges). Knoxville, TN.
 - a. On-line *Current Contents* (through November 27, 1995) - contains about 6000 journals.
 - b. CD-ROM databases of Environmental Abstracts.
 - c. On-line catalog of library holdings.
 - d. Microforms and Documents.
3. Bechtel National, Inc. Library. Oak Ridge, TN.
 - a. DIALOG search of DOE databases.
 - b. Proceedings of Waste Management Conference '95 (CD-ROM).
 - c. On-line catalog of library holdings.

References

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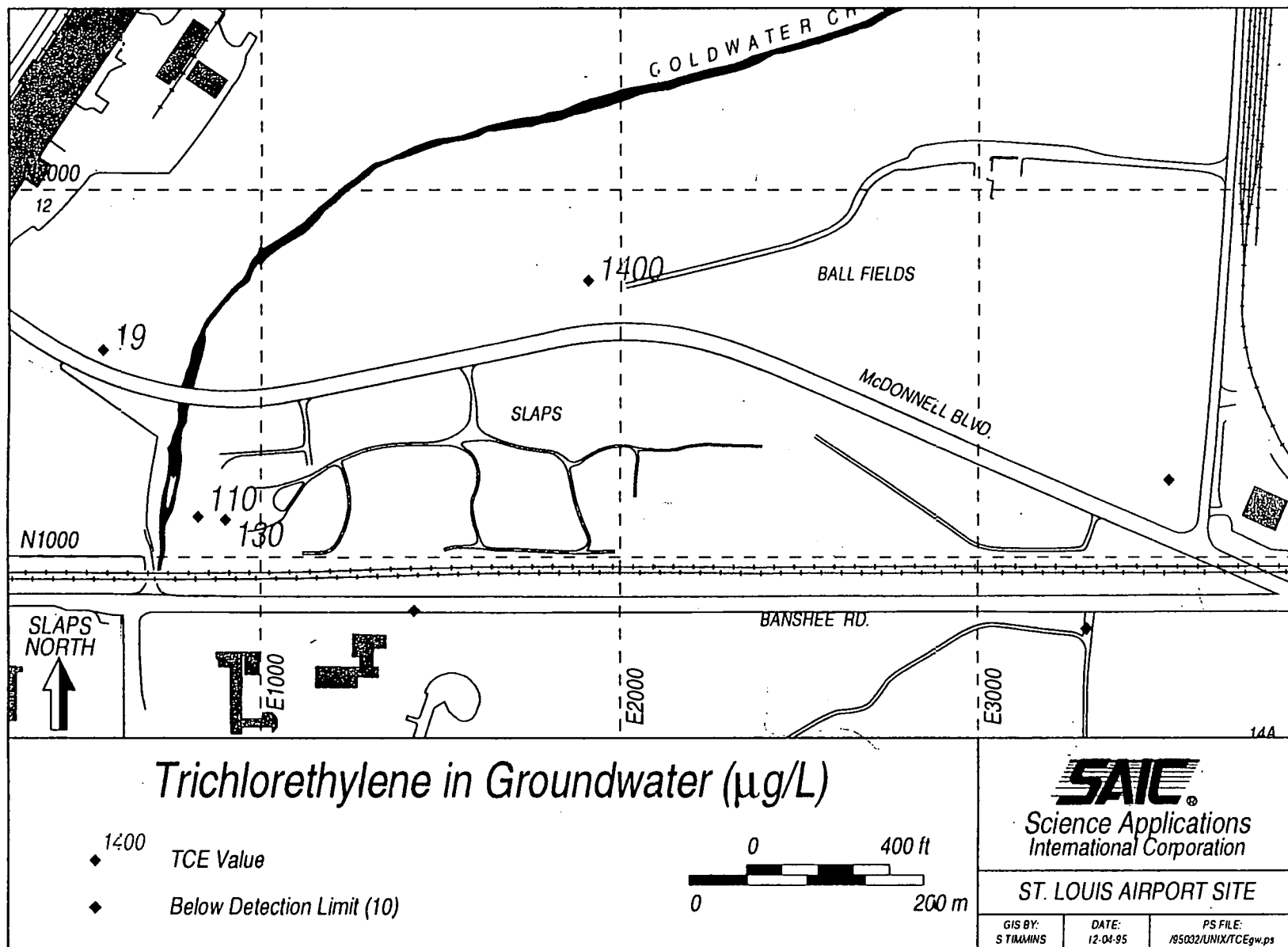
BNI, 1993. Site Suitability Study for the St. Louis Airport Site. Contract No. DE-AC05-91OR21949. Oak Ridge, TN.

BNI, 1994. Remedial Investigation Addendum for the St. Louis Site. DOE/OR/21950-132. Oak Ridge, TN.

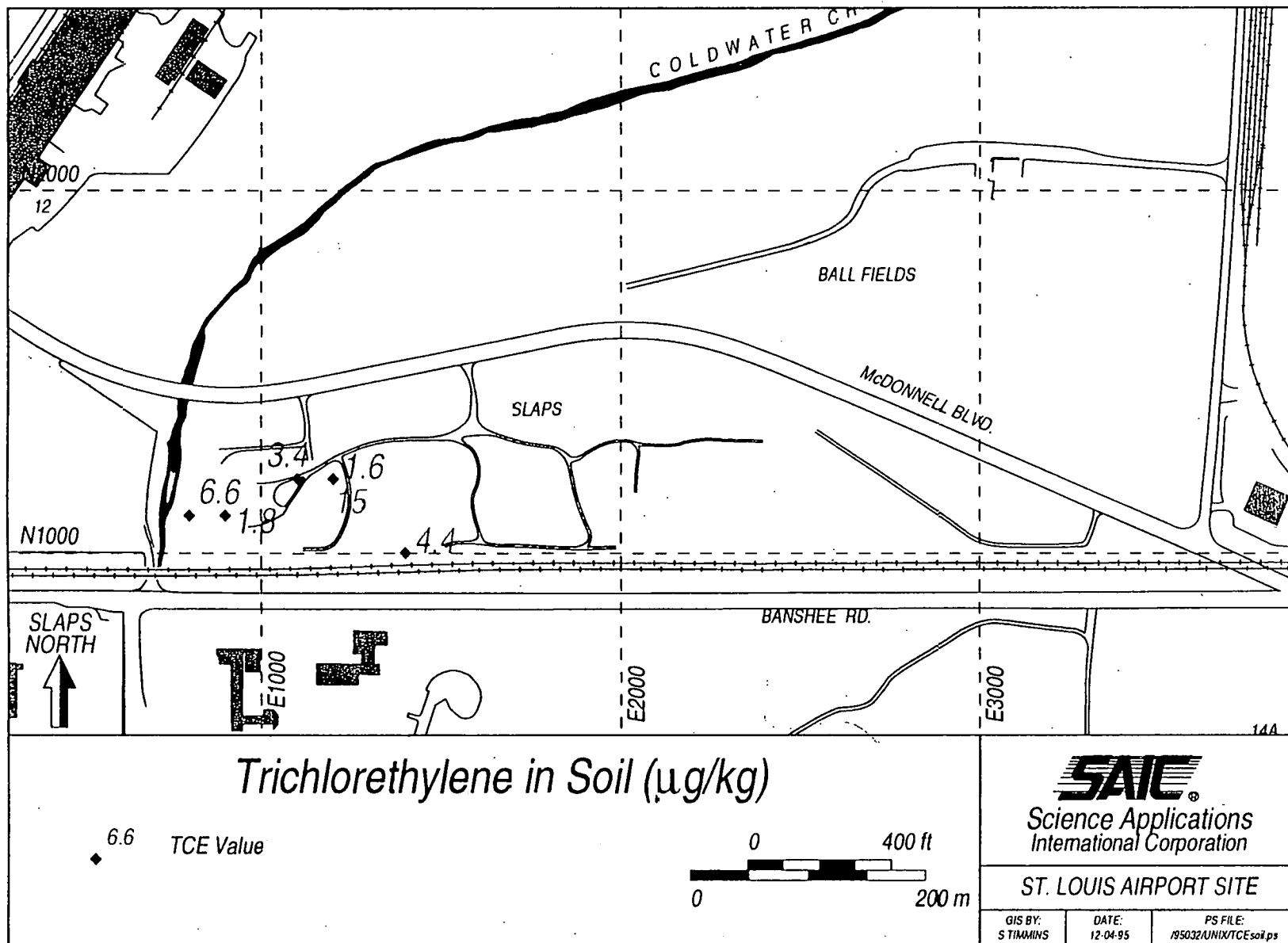
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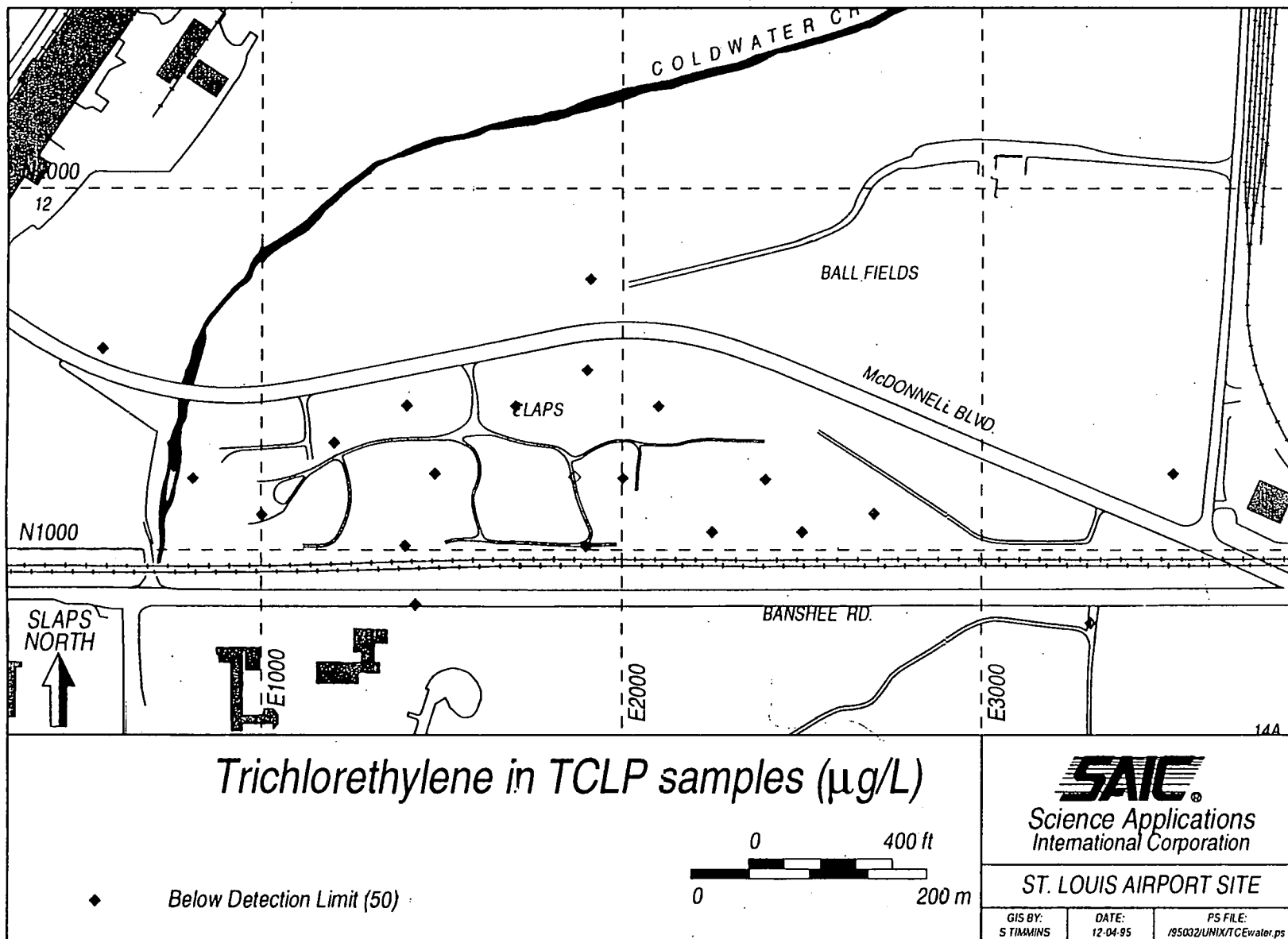
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