Case Study for the Use of a Decision Support Tool: Using SCRIBE to Manage Data during a Triad Investigation, Milltown Redevelopment Site, Milltown, New Jersey

Prepared by:

U.S. Environmental Protection Agency
Office of Superfund Remediation and Technology Innovation
Brownfields Technology Support Center
Washington D.C. 20460

Notice and Disclaimer

This material has been funded wholly by the U.S. Environmental Protection Agency (EPA) under Contract Number 68-W-02-034. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Comments or questions about this report may be directed to Dan Powell, EPA, Office of Superfund Remediation and Technology Innovation (5102G), 1200 Pennsylvania Avenue NW, Washington, D.C. 20460; telephone (703) 603-7196; email powell.dan@epa.gov.

Foreword

This case study is one in a series designed to provide information on use of decision support tools that support the use of data, models, and structured decision processes in decision-making. These case studies include reports on selected tools that have been used to support activities such as site assessment and remediation, data management and visualization, and optimization. They are prepared to offer operational experience and to further disseminate information to project managers, site owners, environmental consultants, and others who wish to screen decision support tools and benefit from their previous use at sites.

Acknowledgments

This document was prepared by the U.S. Environmental Protection Agency's (EPA) Office of Superfund Remediation and Technology Innovation, with support provided under EPA Contract No. 68-W-02-034.

TABLE OF CONTENTS

FIGURES

Figure

1.0 SITE BACKGROUND

The Milltown Redevelopment site, otherwise known as the Former Michelin Tire Company site, is located in the western section of Milltown, New Jersey. It is occupies one of the oldest parts of the town and is bordered by residential and commercial districts along Ford Avenue to the northwest and Mill Pond to the southwest.

The Middlesex County Improvement Authority (MCIA) began planning for the 22-acre Milltown Redevelopment site in 2001. In 2002, a preliminary assessment was conducted on the site to assemble background information and to identify any potential areas of concern (AOCs). The Milltown — Ford Avenue Redevelopment Agency began assisting with the redevelopment process in 2003.

Also in 2003, the MCIA was awarded a $350,000 Brownfields Assessment Grant by the U.S. Environmental Protection Agency (EPA) to conduct a site investigation (SI) that would help quantify suspected contaminants. As a result, an SI and remedial investigation (RI) was conducted to expand on the conceptual site model (CSM) and to identify site-specific contaminants of concern. EPA also provided support for implementing the Triad approach through its Office of Superfund Remediation and Technical Innovation (OSRTI). The Triad approach is an integrated method to manage decision uncertainty at hazardous waste sites. The Triad approach draws on advancing science, technology and practitioner experience to perfect strategies for making site work more defensible, resource-effective, and more responsive to stakeholder concerns (Crumbling and others, 2004). The term "Triad" refers to the three core elements of the approach: systematic planning, dynamic work strategies, and real-time measurement technologies, including field-based analyses.

In addition, the MCIA facilitated an application for New Jersey Department of Environmental Protection (NJDEP) Hazardous Discharge Site Remediation funds to conduct further environmental assessment. This application led to an award of more than $500,000 to the Milltown Redevelopment Agency. At the same time, the Milltown Redevelopment Agency negotiated an agreement with a redeveloper for the area that involved more than 300 age-restricted housing units, together with commercial and open space.

More than 50 percent of the09_Vapor Intrusion Case Study09_Vapor Intrusion Case Study 22-acre site is covered with warehouses and industrial buildings. Industrial use of the site began with a rubber manufacturing plant in the late 1800s and has been succeeded by numerous other industries over its history. The eastern portion of the site was the first developed. All of the buildings on this side of the parcel are abandoned, and many are in a state of advanced disrepair and are dangerous to enter. The western portion of the site was developed more recently, and some buildings remain occupied.

A large and diverse stakeholders' group was organized to plan, conduct, and oversee the Milltown Redevelopment project. The local redevelopment agencies contracted Najarian Associates to provide project and data management. Technical support services in implementing the Triad approach were provided by the Department of Energy's Argonne National Laboratory (ANL) and the New Jersey Institute of Technology (NJIT). EPA also provided support for implementing Triad through its OSRTI, and software support (Scribe and Scriblets) from its Emergency Response Team (ERT). NJDEP provided regulatory oversight. The core technical team during the investigation consisted of personnel from Najarian Associates and S2C2 Inc. Representatives from NJDEP and the EPA provided collaborative oversight of the investigation.

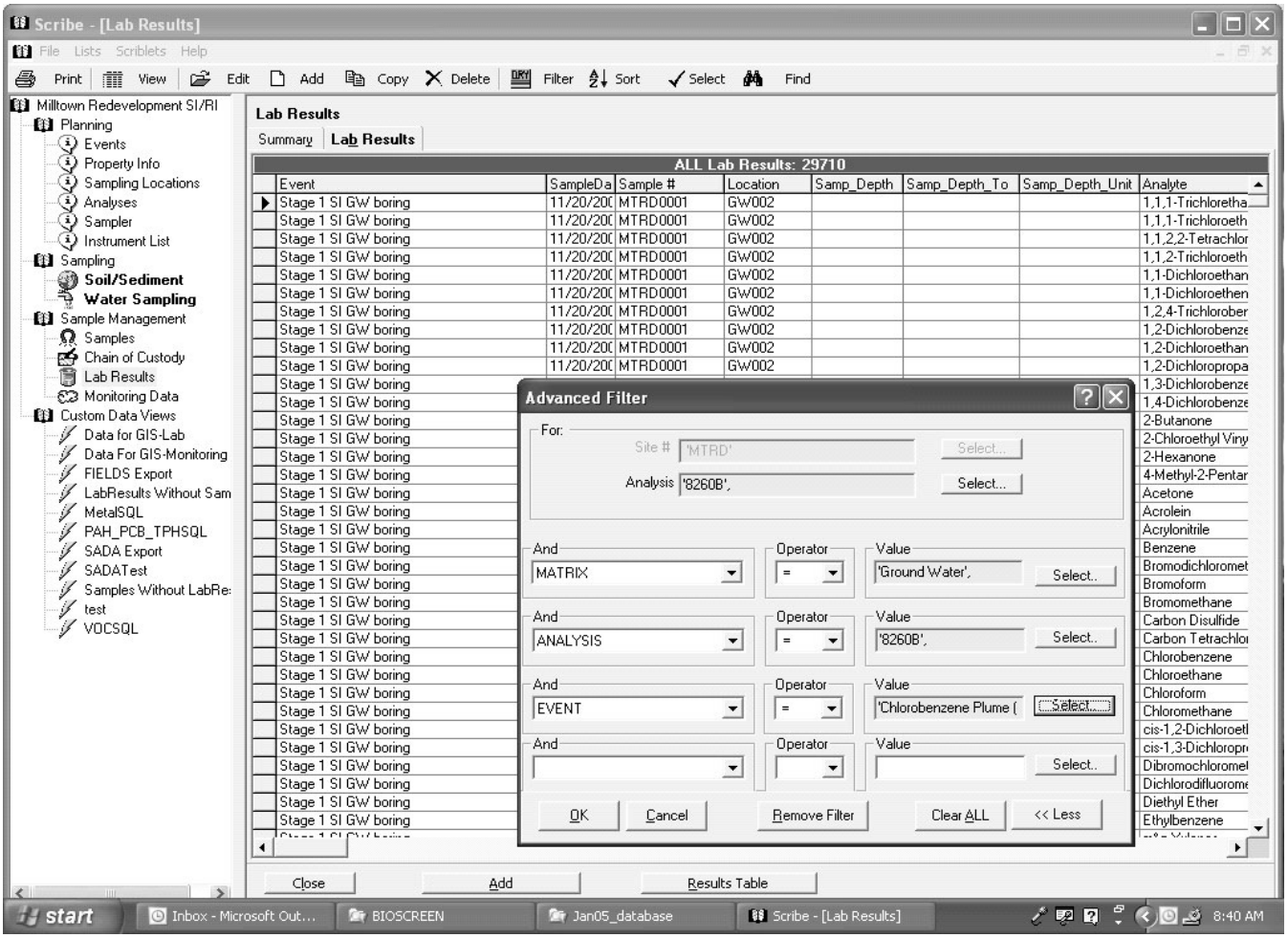
2.0 USE OF DECISION SUPPORT TOOLS

Scribe is a software tool developed by the EPA's ERT to assist in managing environmental data. Scribe captures sampling, observational, and monitoring field data. Examples of Scribe field tasks include sampling soil, water, air, and biota. Scribe can import electronic data, including analytical laboratory results in electronic data deliverable (EDD) format and sampling location data such as global positioning system (GPS). Scribe supports handheld extensions, *Scriblets*, to capture and import sampling and monitoring data that are collected on handheld portable data assistants (PDAs) during field work.

Scribe outputs include labels for samples collected, chain-of-custody generation, and data reports from the analytical laboratory. Scribe provides a flexible user interface to manage, query, and view this information. In addition, Scribe supports exporting electronic data for user services such as geographic information system (GIS) tools and spreadsheets so that analytical data may be further analyzed and incorporated into report writing and deliverables. Figure 1 is a screen shot of Scribe, showing its tool for filtering data.

FIGURE 1

SCRIBE DATABASE AND DATA FILTER TOOL



EPA's Brownfield Technical Support Center (BTSC) identified Scribe as a decision support tool (DST) that would meet the project team's needs of data management. The project team set up a template to import data from electronic sources, creating an all-electronic data pathway that eliminates the transcription errors that are common to many projects. Location data were collected using a GPS, as shown in Figure 2, while sampling data were recorded on a PDA using the Scriblets software. Scriblets allows the user to set up a sampling template before field work begins. The user can enter an initial sample number (EAP01, for example); then, Scriblets automatically advances through a numerical sequence of sample numbers (EAP02 and EAP03, for example) as each form in the template is filled out and entered, streamlining the data acquisition process.

The field team collected samples for analysis of metals, volatile organic compounds (VOC), semivolatile organic compounds (SVOCs), polycyclic aromatic compounds (PAH), polychlorinated biphenyls (PCBs), pesticides, and total petroleum hydrocarbons (TPH), and surveyed in the sample locations. Sampling teams consisted of two members: one to collect the sample, and one to log the result into Scriblets on a PDA in real time. Figure 2 shows a field technician entering sampling data into Scriblets on a PDA. Throughout the day, the PDA was connected to the laptop with a USB cable, and the data were transferred into Scribe using the software's Import process.

FIGURE 2
TECHNICIAN ENTERING SAMPLE DATA TO PDA

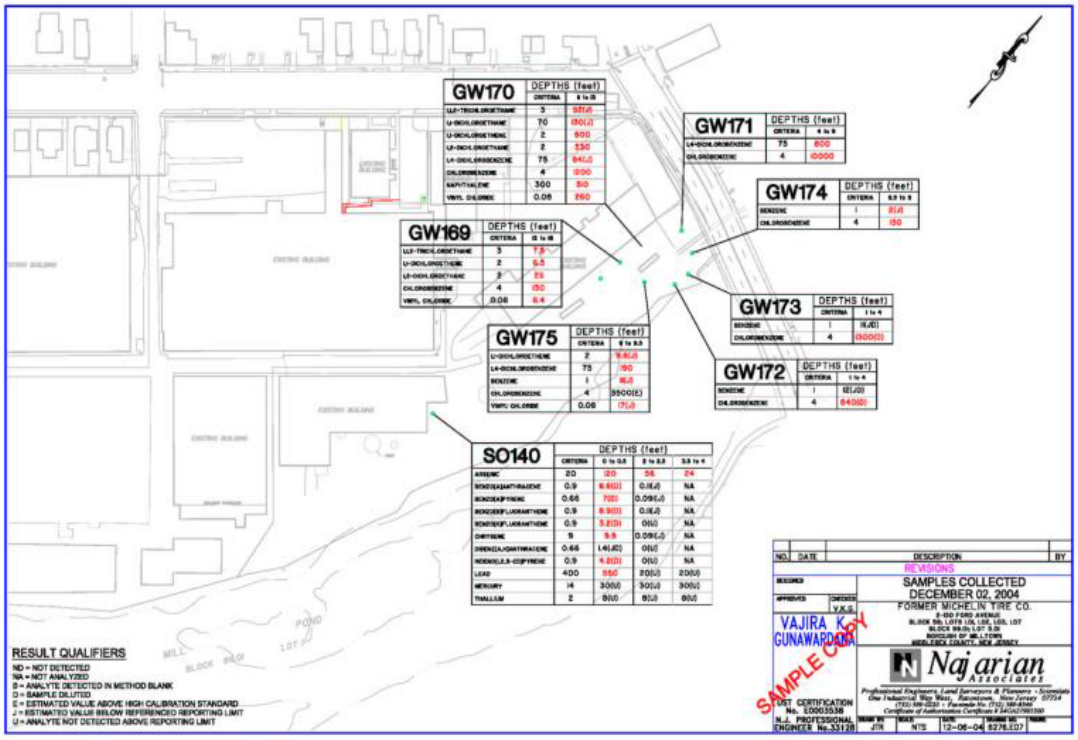
All sample locations were subsequently surveyed with an Ashtech 2-Extreme GPS unit (Figure 3). A TopCon Robotic Total Station was used to extend the GPS capabilities to areas where the unit was blocked from receiving satellite data. (The robotic unit measures the distance from the GPS unit and has a level to measure the elevation difference.) The surveyor was able to record all of the location data on the GPS software and download them into Scribe at the end of the day in the same manner as with the PDAs.

FIGURE 3
SURVEYOR COLLECTING LOCATION DATA WITH GPS

Using this process, the field team was able to sample 336 locations in a little more than 5 weeks' time. The field team collected more than 600 soil samples and 130 groundwater samples. The benefits of streamlined data acquisition and processing using Scribe were most evident during the dynamic investigation of a chlorobenzene plume. The plume was delineated in about 4 days after 62 groundwater and 29 soil samples were collected. The field team employed an adaptive strategy, identifying 40 initial sample locations; more than 800 samples were then collected through three rounds of adaptive sampling. After each round of sampling, the data were imported to Scribe, queried, and exported to AutoCAD through a custom program written by Najarian Associates. The entire project team (including stakeholders who were not present at the site) was able to review tables and maps that summarized the teams' updated understanding of the extents of the plume (Figure 4) at the end of each day and then provide input for the next day's sampling, using a website provided by EPA. In this manner, the plume was delineated, and the CSM was developed to explain the likely source of the plume and the mechanisms that contributed to its spread.

FIGURE 4

MAP OF CHEMICALS OF CONCERN IN THE CHLOROBENZENE PLUME AREA



3.0 LESSONS LEARNED

The data management team at the Milltown site described Scribe as the "cornerstone" of its data management and communication strategy for this Triad project. In the opinion of this team, Scribe significantly reduced the lag time — from months to days — from field sample collection, to on-site laboratory analysis, to generation of report-quality maps. Just as important, the all-electronic data pathway made possible by integrating EDDs, GPS, and Scriblets with Scribe eliminated transcription errors, providing the project team with increased confidence in the quality of the data. Scribe was used to generate sample labels in the field, much like Forms II Lite; however, Scribe uses a Microsoft Access database, and its querying and sorting functions enabled the project team to answer questions about analytical results immediately after the data were entered into Scribe.

Scribe, however, is not a visualization tool. As a result, the data management team developed a customized program that exported data from Scribe to AutoCAD to produce report-quality maps. The maps were then posted to a project website so that all stakeholders had access to the graphics as soon as they were developed, allowing them to track the progress of the investigation in real time. Scribe can also be easily configured to export data to a variety of visualization programs included with the DST matrix, including the Spatial Analysis and Decision Assistance (SADA) program and the Fully Integrated Environmental Location Decision Support (FIELDS) system.

Scribe was integral to implementing all three elements of the Triad at the Milltown Redevelopment site. Data was loaded to Scribe throughout the day as the site investigation progressed; the data was available for sorting, querying and export to AutoCAD program that was used to create plots of the most recent sample results. These plots were shared with the project stakeholders in the field and on the web site (for stakeholders who could not be present in the field. Thus, information was shared with the entire team almost immediately, an important aspect of systematic planning. The rapid turn-around of data from collection to presentation facilitated the dynamic work planning process, particularly during the delineation of the chlorobenzene plume. Scriblets allowed sample results from real-time analytical methods to be loaded to the database several times during the day. All three Triad elements were instrumental in making this project a Triad success story.

4.0 POINT OF CONTACT

James Mack
New Jersey Institute of Technology
138 Warren Street
Newark, NJ 07102
(973) 596-5857
mack@adm.njit.edu

5.0 REFERENCES

Crumbling, D.M., and J.S. Hayworth, B.A. Call, W.M.. Davis, R. Howe, D.S. Miller, and R. Johnson. 2004. The Maturing of the Triad Approach: Avoiding Misconceptions. *Remediation: The Journal of Environmental Cleanup Costs, Technologies and Techniques*, vol. 14, no. 4, pp. 81-96. September 21, 2004.