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APPLICATION OF A WORLD WIDE WEB TECHNOLOGY TO ENVIRONMENTAL REMEDIATION

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INTRODUCTION

As part of the Formerly Utilized Site Remedial Action Program (FUSRAP), the United States Army Corps of Engineers (USACE), Buffalo District, is responsible for overseeing the remediation of several sites within its jurisdiction. FUSRAP sites are largely privately held facilities that were contaminated by activities associated with the nuclear weapons program in the 1940s, 50s, and 60s. The presence of soils and structures contaminated with low levels of radionuclides is a common problem at these sites. Typically, contaminated materials must be disposed of off-site at considerable expense (up to several hundred dollars per cubic yard of waste material). FUSRAP is on an aggressive schedule, with most sites scheduled for close-out in the next couple of years. Among the multitude of tasks involved in a typical remediation project is the need to inform and coordinate with active stakeholder communities, including local, state, and federal regulators.

REMEDIATION APPROACH

In an effort to control program costs, the Buffalo District has implemented a precise excavation approach for removing contaminated soils from its FUSRAP sites. During precise excavation, the soil of a site is "peeled" back in layers, with the exposed surface soil recharacterized using real-time data collection techniques to redefine the contamination footprint before the next layer of soil is excavated. The goal is to ensure that only soils that exceed cleanup goals are excavated for off-site disposition. During the course of a precise excavation, literally thousands of measurements are made each day to guide excavation decision-makers. From this perspective, precise excavations at Buffalo District FUSRAP sites impose heavy data management, integration, and dissemination demands. These data sets must be made available in a timely fashion to contractor's teams on-site, Buffalo District program management staff at their offices, technical team members who are not on-site, and regulators overseeing the remediation activities. The Buffalo District is using secure web sites especially designed to meet these needs.

ASHLAND 1 SITE

Remediation at the Ashland 1 site in Tonawanda, New York, is an example of how the World Wide Web is being used to support the cleanup activities. Remedial activities began there in 1999 and will continue into the year 2000. By the time the excavation work is completed

DISCLAIMER

approximately 120,000 cubic yards of contaminated soil is expected to have been removed and shipped off-site for disposal at International Uranium Corporation in Utah. The Ashland 1 web site is designed to organize and disseminate all data associated with the remedial activities at Ashland 1. The web site was constructed using Microsoft Access™ as the database, ColdFusion™ as the interface between Access and web pages, and Argonne National Laboratory's Maps and Data (MaD™) browser for serving dynamic maps. The web site is served using a Windows NT server and Internet Information Server 4.

Access to the Ashland 1 web site requires a login and password. New data are uploaded on a daily basis. Most of these data have not yet gone through the formal QA/QC process required for unlimited release, and for this reason access to the site is controlled. Besides login/password protection, the Buffalo District uses ColdFusion to monitor the identities of machines that log on to the site, providing an additional level of security.

The Ashland 1 web site provides all data pertinent to the remediation work going on at the site. These data sets include historical data and associated analyses (for example, calculations of the volumetric extent of contamination), as well as data generated daily by the excavation work. Examples of the latter include gamma walkover data combined with data from a global positioning system (GPS), air quality sampling results, waste characterization sampling results from excavated soils, volumes of contaminated soil shipped off-site, and final status survey results. Also included on the Ashland 1 web site are limited electronic documentation, as well as electronic photos of work as it progresses. The web site was also used in the initial stages of the project to track the progress of train cars as they transported contaminated soils from Tonawanda across the country to Utah. This feature is based on trace response data collected by railcar companies as trains pass through the many yards between New York and the Utah location.

Data flows electronically from crews working at the Ashland 1 site through email to Argonne, where it is loaded into appropriate databases. For example, gamma walkover/GPS data are automatically logged as the data are collected. When a survey is complete, the information is downloaded from the logger and sent electronically to Argonne. Within a few hours of data collection, a map interpreting the results is available on the web site. Depending on its type, the data may be disseminated over the web site via tables, static maps, or through Argonne's MaD browser. The MaD browser is a Java applet that provides geographical information system (GIS) mapping capabilities within standard browsers. The MaD browser allows users to browse dynamic, vector-drawn maps within Netscape Navigator or Internet Explorer and to access data tables associated with objects portrayed on those maps. For example, railcars are tracked by displaying a map of the United States with icons representing the locations of various train cars as they travel across the country. Selecting one of these icons on the map calls up a detailed description of the car's containers, as well as a history of the car's path.

The functions of this web site provide several distinct advantages for the Buffalo District. First, authorized users require nothing more than Internet access and a Java-enabled browser to make use of the site. From the District's perspective, this means that there are no per user usage

costs associated with the site. The browser software required to access the site is freely available from Microsoft or Netscape. The only investment for the District is the cost of organizing and presenting the information, a process that would be required in any event. Because access is through ubiquitous web browsers, and because the look and feel of the site is consistent with other web sites, there are no significant training requirements to make use of the site.

Second, because data are centrally located and housed on the Windows NT server, the Buffalo District can be confident that those who use the web site to obtain information are all viewing the same data sets at any given point in time. This aspect is particularly important for FUSRAP work where data changes significantly every day. The alternative of trying to organize, disseminate, track, and control hard copy results would be an extremely complex and costly undertaking, and in the case of a site like Ashland 1 with its voluminous data sets, virtually impossible.

Third, because site data are immediately available to anyone anywhere in the world who has Internet access and the correct login/password, the Buffalo District is able to keep regulators informed and bring technical assistance to the site without requiring people to physically travel to the site. For example, when a problem or issue arises, a conference call can be organized, with each participant having access to the data surrounding the issue via the web site. Or, if there is a need for technical review or oversight on a limited basis daily, the persons providing that review can do so from their office via the web site. Finally, for the regulators involved, monitoring progress at the site is transparent from their own offices, without the need for a staff person to be present on the site every day. A secondary result from making data immediately and readily available is the impact on the overall quality of data sets collected. Posting data results via the web site readily reveals data problems (e.g., incorrect locational information, sensor malfunctions, missing data) that might otherwise go unnoticed until the field work was completed.

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