



Demonstration Bulletin

GIS\Key™ Environmental Data Management System

GIS\Solutions, Inc.

Introduction: GIS\Solutions, Inc. has developed a software system that fulfills a set of needs that is typically answered by multiple, independently run pieces of software. GIS\Key™ takes proven software and puts it under one shell. The results of this integration allow for enhanced database management activities that would otherwise be more difficult or costly to perform. This Superfund Innovative Technology Evaluation (SITE) demonstration was undertaken because the data management capabilities provided by GIS\Key™ are applicable to any Superfund site.

Technology Description: The GIS\Key™ Environmental Data Management System, developed by GIS\Solutions, is a custom developed software system compatible with 386 and 486 micro-computers. The system uses several commercial, off-the-shelf products (i.e., AutoCAD®, FoxBASE™, and QuickSurf™) to create a comprehensive environmental database management system that meets the needs of industry and satisfies hazardous waste site reporting requirements. GIS\Key™ facilitates the collection, reporting, and analysis of site management data by producing a variety of site-specific tables, graphs, and maps.

The system's capabilities include producing geologic cross-sections, boring logs, potentiometric maps, isopleth maps, structure maps, summary tables, hydrographs, chemical time series graphs, tables, and other maps and line graphs that meet reporting requirements. GIS\Key™ site maps typically start with digitized basemaps, including U.S. Geological Survey 7.5 minute quad-

range maps, to provide general topography and features such as streets, highways, schools, and bodies of water for the GIS\Key™ data management system. Site-specific features such as buildings and waste management units are then added. Project maps for Resource Conservation and Recovery Act (RCRA) facilities and Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) sites are stored inside the regional basemaps and act as the visual starting points from which users can obtain specific chemical, geologic, and hydrologic data for each map point.

A primary benefit of GIS\Key™ is that nearly all project data is stored in a single, unified, and structured database. Data redundancy is reduced or eliminated, providing a greater ability to manage data quality. Environmental data for a project—chemical, geological, and hydrological—is stored in the GIS\Key™ database, a relational data management system implemented in FoxBASE™. The database is linked to the other component of the geographical information system, GIS\Graphics, which is built in AutoCAD®. The GIS\Key™ graphical interface depicts wells and boreholes on a map of a site. Data can be entered into the GIS\Key™ database either manually or electronically. Table 1 lists the GIS\Key™ software output.

GIS\Key™ can be used both by staff with little computer expertise or with more advanced data management or AutoCAD® skills. GIS\Key™ graphical and text-based menus guide the user through complex data manipulation and display steps.

Table 1. GIS\Key™ Output

| Chemistry | Geology | Hydrology |
|--|---|---|
| <ul style="list-style-type: none">• Isopleth maps of soil or water quality plan or section view• Chemical concentration time series graphs• Chemical versus chemical graphs, inter- and intra-well• Trilinear Piper diagrams• Chemical concentration versus distance graphs• Presentation-quality data tables | <ul style="list-style-type: none">• Boring logs with company logos• Geologic cross section maps• Isopach maps• Structure maps• Presentation-quality data tables | <ul style="list-style-type: none">• Density-corrected water level contour maps• Floating product contour maps• Hydraulic conductivity contour maps• Water elevation versus time graphs• Floating product thickness versus time graphs• Extraction well graphs• Presentation-quality data tables |



GIS\Solutions provides two levels of system training to accommodate a range of users.

Applicability: This system is designed to assist managers of RCRA facilities and CERCLA sites in the graphical characterization of applicable sites and the management of data. The system handles both soil and groundwater contaminants but does not provide a means for managing ecological assessment or air pollutant data.

Evaluation Results: The evaluation determined whether the software performs the functions claimed by the developer and assessed the accuracy of the GIS\Key™ output. Also, the GIS\Key™ procedures used were reviewed to ensure the data integrity, to evaluate the general usability of GIS\Key™, and to compare GIS\Key™ features to user requirements.

The GIS\Key™ software can successfully generate four types of contour maps to assist in groundwater mapping: hydrogeologic maps, chemical concentration isopleths, geologic structure maps, and geologic structure thickness isopach maps. Several standard chemistry reports and construction and borehole summary tables can be prepared using the GIS\Key™ menu commands. The system can prepare well and borehole logs based on the information contained in the database.

GIS\Key™ does not require specialized computer skills, but some specialized AutoCAD®, electronic data transfer, and database management system skills are needed to make full use of it. GIS\Key™ has a comprehensive scope: it includes chemistry, geology, and hydrology modules. The chemistry module includes review of QC parameters and checks against historical ranges. The geology module includes lithology, user-defined formations, and blow counts. The hydrology module includes derived aquifer parameters such as vertical and horizontal permeability. GIS\Key™ provides a turnkey environmental data management system. As GIS\Key™ stores information in a unified database that provides several validity and consistency checks, its use can improve overall project data quality. GIS\Key™ reviews chemical laboratory QC data and generates exception reports. Sample locations that provided values which fail to meet QC objectives are indicated visually to the user helping to avoid the use of suspect data in maps and reports.

GIS\Key™ provides several editable reference lists, including a list of regulatory thresholds, test methods, and a list of chemical names, aliases, and registry numbers. GIS\Key™ produces presentation-quality graphics. The tables generated by GIS\Key™ are designed to be included directly into reports. The maps, sections and well logs require little or no editing before submittal. GIS\Key™ provides a wide variety of output formats, and menu selections to automate output production. Third-party graphics tools can be used to modify or enhance GIS\Key™ graphic output. Overall, GIS\Key™ is very efficient with many predefined routines and queries; ad hoc queries are only possible using third-party tools. GIS\Key™ runs on standard DOS microcomputers and on local area networks.

The GIS\Key™ database menu provides commands for electronic database import and export. Any of the database files used by GIS\Key™ can be used with the general import and export commands available in the database menu. Structure notes are provided to facilitate the data import process. Data subsets can be exported in a format compatible with the EPA GRITS/STAT program to conduct statistical routines that conform to RCRA guidelines.

Improper use of certain AutoCAD® commands can cause problems with basemap integrity. GIS\Key™ includes limited audit or transaction logging capabilities. GIS\Key™ data consistency and validity checks could be improved as it is possible to enter invalid data. Site data related to ecological assessment and air emissions is not managed by this software.

An Innovative Technology Evaluation Report and a Site Technology Capsule describing the results of the evaluation in more detail will be available early in 1994.

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