TECHNOLOGY ROCKY FLATS

## Demonstration & Deployment Summary

# *Information management to support Remedial Action Program*

**Summary**
In response to the challenge of accelerating the cleanup and closure of the Rocky Flats Environmental Technology Site (RFETS), the Environmental Restoration Program (ER) developed an advanced computer based software system to facilitate rapid decision making. The Remedial Action Decision Management System (RADMS) supports the accelerated remedial action process from the planning stage through the characterization and remediation steps and the final assessment of residual risk following accelerated actions.

**The Need**
With the implementation of the modified closure contract between DOE and Kaiser-Hill Company in 2000, it quickly became apparent that ER could not meet its closure obligations by following traditional CERCLA cleanup approaches formerly employed at RFETS. Consequently, ER redefined its remedial action strategy to emphasize speed, efficiency and quality. The new strategy targeted five areas for streamlining that historically slowed the cleanup process: planning, documentation, laboratory cost and data turnaround time, the regulatory agency interface, and information management.

The success of the accelerated strategy requires a computer-based system capable of effective and efficient manipulation and management of large volumes of decision making information. Review of ER's requirements against available environmental information management systems revealed that while a number of disparate pieces existed, none provided the comprehensive approach needed. Therefore, ER developed RADMS to address the need. RADMS is the "engine" that drives the accelerated remedial action strategy.

**The Technology**
RADMS is a server-based system implemented on the RFETS network using SQL 2000 server software supported by MS Runtime Access 2000, MS Excel and ArcView GIS with Spatial Analyst Extension. RADMS is designed to perform all functions on the server with user access controlled through user groups with permissions granted for performing specific functions. This ensures the ability to maintain data security, quality and reproducibility.

Two key concepts form the foundation for RADMS. First, RADMS is a geographic information system (GIS)-based system that ultimately ties all information to geographic locations. Secondly, RADMS incorporates a central database that controls and directs data to linked modules that perform the various functions required to support the spectrum of ER's decision making activities. It is anticipated that the database will contain over 10 million analytical records by completion of the cleanup program. Following is a description of the RADMS modules:

- ***Environmental database***
  The central database incorporates two internal modules that are transparent to the user. First is the Environmental Data Transformer (EDT) whose purpose is to reconcile legacy data from collection activities spanning the past two decades. These data comprise over 5 million analytical soil and groundwater records collected under various plans and for different objectives. EDT corrects chemical names and CAS numbers, reconciles and consolidates the extensive combinations of data validation qualifiers to a small standard set for ease of use, and checks each record for a variety of environmental science-related business rule deviations introduced into the legacy data. Data packages containing these earlier records are still being reviewed for completeness and entered into the Site electronic data archive. As RADMS interfaces with the Site data archive to extract new information, EDT identifies the new entries and performs the appropriate transformations.

  The second module internal to the central database is the Data Manager. The Data Manager functions as the "data traffic coordinator" and ensures that the appropriate data is delivered to the other modules as requested and that the data always maintain an uncorrupted link with the central database. The Data Manager also provides the interface to external programs including air and

water modeling and advanced statistics. OLAP (on line analytical processing) features enable extremely fast analyses of multiple attributes of large data sets.

- ***Geo-spatial Module***
  This module acts as the graphical user interface (GUI) to the RADMS application and supports the generation of sampling plans by incorporating legacy data points with new sample locations calculated statistically, geo-statistically or by bias selection. The module also generates data posting maps and remediation maps as well as maps of post-remediation residual contamination at various soil depths.

- ***Data Quality Objectives Module***
  This module incorporates the requirements of the sampling and analysis plans for evaluation of data for decision making. The module reduces analytical data as prescribed by the Data Quality Objectives (DQOs) found in the sampling plan. It compares data to method detection limits or background and to the RFETS action levels, calculates sums-of-ratios, and other useful statistics needed to make remedial action decisions.

- ***Verification and Validation Module***
  This module is the gateway into the central environmental database for new data and assures that all new sample data used by RADMS is of defensible quality. The module automates the process of verifying the accuracy and completeness of content and format of electronic data deliverables (EDDs) from onsite and offsite laboratories. It tracks samples to ensure the completeness of field information. Finally, the module performs validation of the incoming analytical data.

- ***Field Data Collection Module***
  This module automates the document generation and tracking associated with sample planning, collection and shipment to onsite and offsite laboratories. The module generates daily sampling plans, sample labels and chain-of-custody forms. The module has two versions. The workstation version is the central planning version that communicates with the central environmental database taking planned sample locations from the Geo-spatial module and assigning relevant tracking codes and requested analytical methods to the samples. The laptop version of the Field Data Collection Module enables the sampling crew to download planned sample information and generate sample bottle labels and chains-of custody forms in the field, then upload the information to the central database at the end of the day. This module eliminates common transcription errors introduced by sampling teams and thereby increases the quality of sample information both from the field and the lab.

- ***Data Quality Assessment Module***
  This module performs PARCC parameter analysis on the validated analytical data and links to statistical analysis programs. The automation of this time consuming process provides planning and remediation personnel a high degree of confidence in the quality of the data used to support the decision making process.

- ***Risk Module***
  This module performs screening-level risk analysis on an area-of-concern basis to assure that risk goals are being met as remediation progresses. It also performs more advanced data evaluation and risk characterization to support a traditional CERCLA risk assessment. At RFETS, this assessment will measure residual risk at the completion of all accelerated remedial actions.

**Benefits**

The ER accelerated cleanup strategy is designed to meet the aggressive RFETS closure schedule while adhering to a conservative budget. Key to ER's success is the ability to make timely decisions, gain the regulatory agencies' support and cooperation, and perform characterization and remediation correctly the first time. RADMS enables these outcomes by providing information management that conforms to program cleanup goals and objectives, efficiently accommodates large volumes of data, and ensures that the quality, reproducibility and security of the information is sufficient to defend cleanup decisions.