

DEVELOPMENT AND IMPLEMENTATION OF INFORMATION SYSTEMS FOR DOE'S NATIONAL ANALYTICAL MANAGEMENT PROGRAM (NAMP)

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ABSTRACT

The Department of Energy (DOE) faces a challenging environmental management effort, including environmental protection, environmental restoration, waste management, and decommissioning. This effort requires extensive sampling and analysis to determine the type and level of contamination and the appropriate technology for cleanup, and to verify compliance with environmental regulations. Data obtained from these sampling and analysis activities are used to support environmental management decisions. Confidence in the data is critical, having legal, regulatory, and therefore, economic impact. To promote quality in the planning, management, and performance of these sampling and analysis operations, DOE's Office of Environmental Management (EM) has established the National Analytical Management Program (NAMP). With a focus on reducing the estimated costs of over \$200M per year for EM's analytical services, NAMP has been charged with developing products that will decrease the costs for DOE complex-wide environmental management while maintaining quality in all aspects of the analytical data generation. As part of this thrust to streamline operations, NAMP is developing centralized information systems that will allow DOE complex personnel to share information about EM contacts at the various sites, pertinent methodologies for environmental restoration and waste management, costs of analyses, and performance of contracted laboratories.

INTRODUCTION

The National Analytical Management Program (NAMP):

The National Analytical Management Program (NAMP) is a national program operated within DOE's Office of Site Operations (EM-70). It was created following redeployment of the program from DOE Headquarters to the Idaho Operations Office in a Memorandum of Agreement approved by the Assistant Secretary for Environmental Management on July 17, 1997. The mission of the NAMP is to promote quality in the planning, management, and performance of sampling and analysis activities which generate characterization and monitoring data in support of DOE environmental quality initiatives. The NAMP vision is to be recognized as a national leader through a dynamic cross-cutting program that promotes best practices and management tools resulting in effective, efficient, and reliable analytical data and services.

NAMP Information Systems:

As part of this thrust to streamline operations, NAMP is developing centralized information systems that will allow DOE complex personnel to share information about EM contacts at the various sites, pertinent methodologies for environmental restoration and waste management,

costs of analyses, and performance of contracted laboratories. To date, four separate information systems have been created: the National Sample Tracking System (NSTS); the Directory of EM Sampling and Analysis Resources (DEMSAR); the *DOE Methods for Evaluating Environmental and Waste Management Samples (DOE Methods)*, a document based on information in the DOE Procedures Database; and the Integrated Performance Evaluation Program (IPEP). The purpose, history, current status, and future plans for each of these information systems will be discussed below.

The National Sample Tracking System (NSTS):

One of the charges to the predecessors of NAMP was to establish a sample management information system to store and report information about DOE complex-wide sample analysis activities. In order to implement such a system, the NAMP predecessors, in collaboration with the major DOE sites, developed the concept of the National Sample Tracking System (NSTS).

The information collected in this database was designed to be used to: 1) predict insufficient or surplus analytical laboratory capability; 2) assess laboratory utilization and sample management efficiency; 3) optimize the type and level of commercial laboratory participation in EM work; 4) evaluate the need for DOE analytical laboratory construction, upgrading, or closure; 5) prioritize method development and training programs; and 6) determine the level and direction of funding necessary to carry out the required sampling and analysis activities.

The feasibility of this system concept was established by the NSTS pilot test, which was carried out in March 1993. This project tested procedures for collecting data, availability of data, cost, ease of reporting, and the compatibility of EM's data requirements with data being collected in the course of routine local Sample Management Office (SMO) operations. Some minor changes were made based upon the results of the pilot study, and the system was put into production operation in October 1993. As the system went into production, ambiguities in the data element definitions were found, which resulted in inconsistencies in the quality of the data reported. The database was to be updated quarterly. The NSTS was established on a World Wide Web (WWW) site to allow for easier data input.

Directory of EM Sampling and Analysis Resources (DEMSAR):

The DEMSAR was designed to be a listing of information about all organizations within DOE that oversee or conduct environmental sample analyses, with relevant points of contact (POCs). For each of these organizations, the DEMSAR included current information regarding the internal DOE laboratories used and the commercial laboratory contracts in force. The DEMSAR also included Operations Office POCs for sampling and analysis issues and equivalent POCs at Area Offices and Sites, where applicable and known. The DEMSAR was organized alphabetically by Operations Office, with a separate chapter for each. Each chapter contained the following sections: Operations Office POC; Area Office POC; Site/Installations; Sample Management Organizations; Internal DOE Laboratory Usage; and Commercial and other non-DOE Laboratory Usage. The initial information was gathered from the field in FY94. The DEMSAR was established on a WWW site to allow for easier data input for planned quarterly updates.

DOE Methods for Evaluating Environmental and Waste Management Samples (DOE Methods):

DOE Methods was designed to support sampling and analytical activities for evaluating environmental and waste management samples that are unique to the DOE complex. *DOE Methods* is the result of extensive cooperation from all DOE analytical laboratories, which all contributed key information and provided technical reviews. Laboratory personnel at DOE sites were contacted to obtain the procedures they were using for analyzing radioactive and other hazardous waste samples. These procedures were originally gathered in hardcopy form and then transformed into text and image files that were stored electronically in the DOE Procedures Database. This database currently contains approximately 2,000 full-text procedures, most of which are procedures for radiochemical analyses.

Procedures are generally site-specific documents, giving a level of detail that might refer, for example, to specific instruments. Methods are more generic, but specific enough to be reproducible. Methods, not procedures, are included in *DOE Methods*.

The *DOE Methods* was developed from the information in the DOE Procedures Database. Chapter editors, together with DOE and other participants in this program, identified analytical and sampling method needs and selected unique methods or methods consolidated from similar procedures used at more than one DOE site for potential inclusion in this document. Initial selection was based largely on DOE needs and procedure applicability and completeness. Methods appearing in this document are one of two types, "Draft" or "Verified." The Draft methods included in this document are those methods which have been reviewed internally and show potential for eventual verification, but they have not been reviewed externally, and their precision and bias may not be known. Verified methods in *DOE Methods* were reviewed by volunteers from various DOE sites and private corporations. The Verified methods have delineated measures of precision and accuracy. All pertinent reviewer comments were addressed by the author of the method so as to meet technical approval by the reviewers. Once all comments were satisfactorily resolved, the method was incorporated as fully verified. This process enhances method verification for EM sampling and analysis activities.

The present document is a resource containing methodology that may be used when regulatory methods are not required. This document complements the established documents of other agencies, such as the U.S. Environmental Protection Agency's (EPA's) laboratory manual, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846)*; statements of work (SOW) for the EPA Contract Laboratory Program (CLP); and other EPA standard methods, such as those developed for determining pollutants in drinking water. In addition, *DOE Methods* provides guidance in field sampling and the analysis of materials containing radioactivity. *DOE Methods* includes methods for collecting representative samples and for determining the radioisotope activity and organic and inorganic composition of a sample. These determinations aid in defining the type and breadth of contamination and thus determine the extent of environmental restoration or waste management actions needed, as defined by the DOE, the EPA, and others.

These new methods have been developed for three primary reasons: 1) to apply technological advances, 2) to reduce waste, and 3) to analyze components of complex matrices. *DOE Methods* incorporates these methods into one document. This program is designed to expedite technology

transfer, reduce costs, and improve the guidance needed for EM sampling and analytical work. *DOE Methods* also provides associated guidelines for selecting and using methods. These guidelines can be used to address conventional as well as unique EM sampling and analysis challenges found at sites throughout the DOE complex. The document was established in a WWW format, and was designed to be a living document, with periodic updates, as determined necessary by the editors.

Integrated Performance Evaluation Program (IPEP):

The fourth information system established by NAMP is the Integrated Performance Evaluation Program (IPEP), a program that uses information from existing national performance evaluation (PE) programs as a cost-effective way to monitor analytical laboratory performance. Without an ongoing objective evaluation of a laboratory's ability to provide accurate analytical results, laboratory data could be declared invalid by regulators, rendered useless to program and facility managers, and/or challenged by the public. The IPEP is designed to provide oversight and assessment of, and technical support to, all analytical laboratories providing data to EM programs. The IPEP functions as an umbrella organization, collecting, collating, and analyzing information from multiple PE programs to provide a global assessment of an analytical laboratory's performance. The IPEP combines its report function with assessment response, statistical analysis, and long-term examination of analytical methods to provide an integrated assessment system. This integrated approach is a unique concept, designed to maximize the usefulness of information from the PE programs.

The current program uses results from existing EPA- and DOE-administered PE programs to provide assessment of a spectrum of matrices and analytes covering the various inorganic, organic, and radiological categories. The IPEP PE results database contains full study results for the last 16 of EPA's Water Supply Studies (WS026 - WS041) and the last 16 Water Pollution Studies (WP025 - WP040), as well as the 32 most recent DOE's Quality Assessment Program Studies (QAP18 - QAP49) and all information from DOE's Mixed Analyte Performance Evaluation Program: the two pilot studies, four water matrix studies (MAPEP-94-W2 - MAPEP-97-W5), and three soil matrix studies (MAPEP-95-S2 - MAPEP-97-S4). Information has also recently been collected from most DOE Operations Offices and SMOs on laboratories being used and the types of analyses being done. These data have been installed in the laboratory identification database, which has recently been linked to the results database. Work has begun on a WWW interface for data input from the field into this system.

The IPEP has conducted two pilot studies to implement and evaluate its procedures and protocols, one with the Idaho National Engineering and Environmental Laboratory SMO and the other with the DOE Albuquerque Operations Office Field Sample Management Program. These pilot studies have provided the IPEP developers with an opportunity to test the feasibility of the proposed operating mechanisms and allowed the eventual users of the reports to have direct input about the report formats, technical content, and other user needs in these reports during the developmental stage. In addition to the various hardcopy reports, the IPEP has also developed electronic versions of the reports to test means of expediting dissemination of the information to the end users via its WWW site (URL: <http://www.cmt.anl.gov/ipep/>). The IPEP has now been initiated at three DOE Operations Offices and has been successful in providing the accurate and

timely information needed to monitor and assess the ability of analytical laboratories to produce quality data.

Future Plans for NAMP Information Systems:

The *DOE Methods* is being re-established in a WWW format, to be accessible through the NAMP WWW site (URL: <http://www.em.doe.gov/namp/>). It will be maintained as a static document for the near future.

As there are many common elements in the other three information systems, and they are somewhat symbiotic, we are examining them to see if they can be combined into a single database, accessible through the WWW. In order to produce valid reports on laboratory performance, IPEP needs the laboratory identification and contractual information, as well as the current POCs, at the various Operations Offices and sites, which is information also needed for the purposes of DEMSAR and NSTS. A single input and output source for the similar elements in the DEMSAR and NSTS databases will help eliminate some of the ambiguities that were discovered when trying to use information from the two separate databases to produce reports of various kinds. Combining the databases can also relieve some of the effort and repetition required for data input by the SMOs.

In addition, we are looking to make information gleaned from DOE audits of laboratories available through a WWW site. By sharing information, we hope to cut costs and alleviate some of the effort required to perform audits. A central WWW site for the databases will also facilitate use of the laboratory performance evaluation information in audits.

The submitted manuscript has been created by the University of Chicago as Operator of Argonne National Laboratory ("Argonne") under Contract No. W-31-109-ENG-38 with the U.S. Department of Energy. The U.S. Government retains for itself, and others acting on its behalf, a paid-up, nonexclusive, irrevocable worldwide license in said article to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government.

This work was supported by the U.S. Department of Energy under Contract W-31-109-ENG-38.