United States Government **Department of Energy**
MEMORANDUM

Date: 07-Sep-94

Reply to Attn of: EM-263 (Carter: 301-427-1677)

Subject: Institutionalizing the Data Quality Objectives Process for the Office of Environmental Management's Environmental Data Collection Activities

To: Distribution

To balance U.S. Department of Energy (DOE) environmental sampling and analysis costs with the need for sound environmental data that address regulatory requirements and stakeholder concerns, DOE must implement approaches to streamline procedures, minimize time requirements, and eliminate unnecessary costs associated with current environmental sampling and analysis activities. Accordingly, it is the policy of the Office of Environmental Management (EM) to apply up-front planning, where practical, to ensure safer, better, faster, and cheaper environmental sampling and analysis programs for all EM projects and operations. Specifically, it is EM policy that the data quality objectives (DQO) process be used in all environmental projects where there may be a need to collect significant environmental data. The DQO process has already been adapted to site characterization and remediation in DOE's Streamlined Approach for Environmental Restoration (SAFER) program. In addition, the Office of Waste Management is developing guidance to apply the DQO planning process to efficiently define and integrate process knowledge information with sampling and analysis to streamline and expedite the activities needed to meet regulatory requirements and public concerns.

The DQO Process, defined by the U.S. Environmental Protection Agency (EPA), is a series of planning steps to identify and design more efficient and timely data collection programs. The DQO process relies heavily on customer and supplier communication to define data requirements and acceptable levels of errors in decision-making before major resources are expended on data collection and to assure the customer (whether internal or external) is satisfied with the results. The DQO process is outlined in Attachment A. An example of how to integrate process knowledge into the DQO process is described in Attachment B.

In October 1993, the EPA issued its interim final "Guidance for Planning for Data Collection in Support of Environmental Decision Making Using the Data Quality Objectives Process" (EPA QA/G-4). This document provides excellent guidance on the steps of the DQO process for developing data quality criteria and performance specifications for data operations. The EPA's Superfund program has tailored that guidance to its specific programmatic needs with its interim final guidance on "Data Quality Objectives Process for Superfund" (EPA/540/G-93/071, September 1993). Attachment C contains these two EPA guidance documents.

In your application of the DQO process, expertise of the Analytical Services Division (ASD), EM-263 is available to provide technical assistance. ASD can provide consultation on specific issues and help EM programs develop an independent capability for planning sound sampling and analysis projects.

ASD has been providing training and direct technical assistance to the field in using the DQO process to plan, implement, and assess site characterization, waste characterization, and new remedial action technology. Implementing the DQO process has successfully achieved substantial cost savings for waste characterization and environmental remediation projects at Hanford, Oak Ridge, and Savannah River.

The DQO process has application for environmental sampling and analysis planning EM-wide, including environmental restoration, waste management, facility deactivation, decontamination and decommissioning, and technology development projects. Some potential EM applications of the DQO process include:

- Waste Management
    - Characterizing waste, using process knowledge verified by minimal necessary sampling and analysis data, to meet acceptance criteria for treatment, storage, and disposal
    - Designing optimized monitoring networks for groundwater and surface water discharges and air emissions

- Environmental Restoration
    - Focusing regulatory and public concerns relating to remediation
    - Effectively identifying target analytes of concern for remedial activities
    - Determining when remediation has met cleanup levels

- Facility Transition and Management
    - Performing characterization assessments, using existing information or collecting new data, to verify facilities for acceptance into the EM program
    - Evaluating alternative end-state conditions and planning facility deactivation in preparation for eventual decontamination and decommissioning
    - Designing optimized short- and long-term environmental surveillance and monitoring

- Decontamination and Decommissioning
    - Determining location and levels of facility contamination
    - Determining when decontamination and decommissioning is complete

- Technology Development
    - Determining what constitutes and acceptably demonstrates success in technology development and evaluation

For further information and assistance in implementing EM's policy for institutionalizing the DQO process across environmental data collection activities, please contact the Analytical Services Division, EM-263, at 301-427-1677 or 301-903-7945 (voice mail).

Thomas P. Grumbly
Assistant Secretary for Environmental Management

ATTACHMENT A

Data Quality Objectives Planning Process

The DQO planning process consists of seven key steps:

1. State the Problem: Stakeholders work together to define their concerns and issues based on descriptions of the site, waste stream, issue, etc., and agree on the question or problem to be studied.

2. Identify the Decision: Stakeholders design the answer or result that will answer the question or solve the problem, including the threshold level for action.

3. Identify Inputs to the Decision: Stakeholders define the measurements needed to answer the question.

4. Define the Boundaries: Stakeholders define the time and space circumstances covered by the decision.

5. Develop a Decision Rule: Technical staff and stakeholders develop the formulation to obtain the needed data (quality and quantity) and to identify acceptability or confidence in the ultimate decision.

6. Specify Acceptable Limits on Decision Errors: In concert with Step 5, stakeholders define the tolerance for making incorrect decisions.

7. Optimize Data Design: Technical staff identifies the most resource effective data collection design.

Implementation of the DQO process forces data suppliers and data users to consider the following questions:

- What decision has to be made?

- What type and quality of data are required to support the decision?
- Why are new data needed for the decision?
- How will new data be used to make the decision?

The DQO planning process has several notable strengths. It brings together the right players (stakeholders and technical staff) at the right time to gain consensus and commitment about the scope of the project. This interaction results in a clear understanding of the problem, the actions needed to address that problem, and the level of uncertainty that is acceptable for making decisions. Through this process, data collection and analysis are optimized so only those data needed to address the appropriate questions are collected. Similarly, SAFER represents an enhancement of the DQO planning process by combining planning with remedy selection and implementation, resulting in a process for addressing all facets of an environmental restoration project.

ATTACHMENT B

DECIDING WHEN TO APPLY PROCESS KNOWLEDGE OR PERFORM SAMPLING AND ANALYSIS FOR WASTE CHARACTERIZATION – EMPLOYING THE DATA QUALITY OBJECTIVES PROCESS

Efficient characterization of DOE's large number of waste streams relies on information obtained from process knowledge (PK), sampling and analysis (S&A), or from a combination of both. PK means applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used (40 CFR 262.11(a)(2)). This would include knowledge about the origin, storage, use, and potential exposure of the waste material. For example, if the feed stocks for making a product are known, the likely range of chemical components in the waste streams can be predicted. This information may be sufficient to address regulatory concerns.

To the extent applicable, using PK to characterize waste is more cost effective than S&A. What is needed is a logical approach to identify the sufficiency of PK to characterize a particular waste and what is the minimum amount of new S&A data necessary. The DQO planning process focuses on these specific questions. DQO planning helps stakeholders decide what questions require characterization information and determine whether those questions can be answered by existing PK, if the PK must be supported by new S&A data, or if new data are required because PK is entirely inadequate. The first several steps of the DQO process help determine whether existing PK is adequate to characterize the waste. If PK is determined insufficient, the last few steps of the DQO process lay out the new data needs and optimize the S&A design.

Attached is a flow chart illustrating the basic framework for applying DQO planning for waste characterization. First the issues and regulatory drivers that form the basis for the need to characterize a waste are identified. Then the questions, possible answers, and data needs for addressing those issues and drivers are formulated. Waste characterization issues and regulatory drivers may involve determining whether a waste stream meets treatment, storage, or disposal waste acceptance criteria. Questions to address these issues focus on whether PK satisfactorily determines the waste content. Questions about validity of PK may include: how accurate is the knowledge of the waste generation process, can the waste be traced to the point of origin, has any significant degradation of the waste occurred, has anything been added to the waste, and has there been adequate quality assurance / quality control of the PK determination?

Once questions and data needs are determined, relevant existing data are compiled. Existing data include both PK or S&A information already available. Existing data may be obtained from manifests of the subject waste or waste generated from areas or processes matching the subject waste, or from knowledge about the specific process that generated the waste. When all relevant existing information is compiled, it is evaluated to determine if it is sufficient to meet the data needs established during the first several steps of the DQO process. If existing information is sufficient, no further characterization should be required. If not, then new data are necessary, and a S&A plan based on the determined data needs should be designed.

APPLYING DQO PROCESS PLANNING TO WASTE CHARACTERIZATION