

READINESS REVIEW FOR SITE CHARACTERIZATION: A SYSTEMS APPROACH

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ABSTRACT

Fulfilling the requirements for site characterization of a waste disposal facility may require the integration of many disciplines into a program of hydrogeologic investigations, air and water quality measurements, radiological characterization, meteorological investigations, ecological investigations, and socioeconomic studies. The preceding represent only one segment of the complex issues facing any project planning field activities. Other and more difficult aspects are related to (1) defining and integrating the tasks to prevent duplication and increased costs, thereby promoting efficiency, (2) organizing and understanding the system of contracts that either support or direct performance of tasks, (3) identifying the procedures which control performance of work in the field and in the office, and (4) gaining concurrence among those responsible for the work that field activities will be managed and administered in a specified manner.

A graphic representation of the system to perform site characterization was the focus for the readiness review. It was effective in (1) identifying procedures which needed to be developed or expanded to support or include an activity, (2) defining scopes of work and responsibilities of various contractors, (3) identifying deficiencies in a complex system of responsibilities and contractors, and (4) developing a consensus and understanding of how field activities would be administered, controlled, and managed. A general description of the systems approach may help other projects in planning and organizing field activities.

INTRODUCTION

A readiness review has multiple purposes and uses. Most importantly, it is a method that allows management to evaluate and improve the likelihood of successfully undertaking an activity. The conduct of a readiness review results in the determination of whether or not both the requirements and the tasks necessary to perform the activity are identified and understood. Without definition of these major components, success is unlikely.

Readiness reviews can also aid in other determinations while planning for site characterization, some of which are to

- Show correspondence between the regulatory requirements and the operating standards
- Initiate plans to evaluate compliance with health, safety, and environmental standards
- Determine if adequate organizational structure exists to conduct activities
- Provide for an organized set of plans, procedures, and contracts to perform the work
- Reveal any inconsistencies among the organizational structure, plans, procedures, and contracts
- Identify any difficulties in scheduling critical path activities.

Thus, the essence of a readiness review is the evaluation of system definition or establishing component relationships. A graphic representation may be used to identify the components and their interrelationship. The following sec-

tions discuss the benefits of a readiness review before starting field activities and the use of a graphic representation of the system to conduct site characterization as the means to evaluate the readiness to begin field activities.

OVERVIEW OF SITE CHARACTERIZATION

The general purpose of site characterization is to (1) obtain estimates of geological, hydrogeological, and hydrological parameters; (2) understand the geological, hydrogeological, and hydrological characteristics of the site and environs; (3) determine the seasonal variability of parameters related to air quality, meteorology, hydrology, hydrogeology, ecology, and wildlife; and (4) collect social and economic information. Information from site characterization activities supports license and permit applications for the proposed waste disposal facility. The information is also used to support impact analyses in safety and environmental documentation, to provide baseline information for an operational monitoring program, and to provide data required to support safe design and operation of the facility.

Identification of the parameters for site characterization is a complex process. A first step in conducting a readiness review is to establish performance objectives and technical requirements for the site through the review of applicable regulations. These objectives and requirements form the bases for scientific and engineering staff to develop the list of parameters. In developing the list, technical staff considers guidance documents by state and federal agen-

cies, the requirements of computer models, and data requirements for engineering and technical calculations.

A site characterization plan for the project identifies the parameters and information that are required and suggested in regulations and guidance documents. A sampling plan establishes the frequency and duration of field measurements and sampling and prescribes the methods for performing field measurements, collecting samples, and performing laboratory analyses. Moreover, the sampling plan identifies the procedures to perform site characterization tasks and the organization of work for conducting field activities by technical staff, consultants, and contractors.

BENEFITS OF READINESS REVIEW FOR SITE CHARACTERIZATION

Site characterization to support the licensing and permitting of a facility is a complex activity which spans many disciplines and requires performance of all work to detailed standards. Not only are the scopes of work for characterization tasks diverse, but the performance of tasks requires specialized training and equipment. Field activities are likely to be performed by some combination of staff, independent consultants, and contractors.

A major benefit of conducting a readiness review for site characterization is the delineation of responsibilities for performing the work and standards by which work is performed. A clear definition of responsibilities and standards may be complicated due to the variety of activities that are being performed at any one time in the field, different standards of quality among the components of work, and tasks that are conducted by various individuals with multiple administrative reporting structures.

Ensuring the quality of the work and maintaining the formal and informal flow of information among the groups conducting site characterization are required to successfully complete field activities. These requirements may result in multiple reporting structures for managing and organizing field activities and collecting, disseminating, and using technical information. Determining and understanding the complexity of organization is another benefit of a readiness review for site characterization.

After complexities are defined, readiness review tasks become the detailed identification of site characterization activities, the determination of the standards and procedures required to perform the work, and the means to evaluate the adequacy of the plans, procedures, and contracts to perform the work. Inherent in systems analysis is the concept that the system should be sufficiently simple at all levels to be readily comprehended. Systems which are incomprehensible are to be avoided because a strong likelihood exists that they will fail. A basic difficulty in understanding and scheduling site characterization tasks is establishing relationships among the varied tasks. Some

tasks are strongly related and their relationships are obvious. In other cases, tasks may be weakly related and their precise relationships must be established during characterization. A graphical method can be implemented to illustrate how all of the components of site characterization fit together, thus simplifying the system and aiding the determination of whether or not a project is ready to begin field activities.

APPLICATION OF READINESS REVIEW TO SITE CHARACTERIZATION

Site characterization may be divided into two components, administrative and technical. Integration of the two components establishes the system to manage site characterization. Part of the readiness review process is to identify technical and administrative tasks to be performed for the generation and control of characterization data, groups responsible for the performance of the tasks, and documents to be used by responsible groups as guides for the tasks. Preliminary identification of tasks through readiness review enhances task manageability. A description of the administrative and technical work components and associated tasks is provided below.

Administrative and Technical Tasks

The purpose of administrative tasks is to establish a system of procedures and controls to ensure that information generated from characterization activities is sufficient and appropriate for project use. Major administrative tasks include the administration of (1) contracts that guide contractor personnel in the performance of work, (2) a quality assurance/quality control (QA/QC) program that establishes quality requirements for contractor and project personnel, (3) a system for document and change control, (4) a system for data management, and (5) project procedures and instructions that guide project personnel in the development and performance of work.

The purpose of technical tasks is to provide instruction for the performance of characterization activities to enhance the usefulness of generated information. Major technical tasks are (1) developing site characterization plans, sampling plans, and procedures; (2) preparing technical specifications for contractors and consultants; (3) establishing a QA/QC program; (4) developing and administering a regulatory compliance program; (5) reviewing contractor submittals which include invoices for completed work and technical submittals to demonstrate compliance with technical requirements of contracts; (6) modifying plans, procedures, and technical instructions as required; and (7)

reviewing and evaluating information generated from field activities.

Administrative and Technical Functions in the Bechtel System

Development of a structure to manage the technical and administrative portions of such a diverse program of work by staff, consultants, and contractors represents a challenge. Successful characterization depends upon the integration of the technical and administrative work components into a system with review and feedback on the status of activities. Such a system allows for frequent assessments of the adequacy and appropriateness of collected information.

Generally in the Bechtel system, the project engineer is responsible for the technical conduct and quality of work. The administration of contracts is the responsibility of the field manager and/or the procurement officer. However, the project engineer is active in the development and management of contracts and in their administration.

Bechtel project personnel rely upon a system of contracts and work orders for the performance of field work. It is the responsibility of Bechtel field supervisors to monitor performance of work, evaluate data generated through the performance of contracts, amend planned activities as appropriate, and ensure that the information collected has sufficient quality for the planned use. The technical reporting structure of the field supervisors is to the project engineer, but the transmittal of reports and information is through the field manager because he is responsible for the system of field document control.

Readiness Review to Begin Site Characterization

After the plans, procedures, technical specifications, manuals, QC checklists, etc. are developed or nearing completion, a readiness review for initiation of field activities is conducted. First, regulatory and environmental compliance requirements are reviewed using a project regulatory matrix (1). This is to ensure that all the permits to conduct field activities are in place and that all notifications and reporting requirements are understood by project personnel. Next, an evaluation is conducted for each activity (e.g., geologic investigations) to determine if the means are in place to perform and control work (i.e., if the appropriate technical specifications for contract work, project procedures, contractor standard operating procedures, and work orders are established). This phase spans multiple contracts and re-

quires the integration of plans and procedures with contractor plans, procedures, and instructions.

Graphic Representation Used to Coordinate Readiness Review

In order to understand and explain the system, a comprehensive graphic representation of the organizational structure to perform the work and to control the collection and flow of technical information was constructed. Figures were developed from the comprehensive graphic representation to simplify components of the system for the benefit of the reader. An explanation of each of the figures is provided below.

Figure 1 illustrates the system for administration of characterization activities. Characterization tasks are administered by the procurement officer and field manager and are completed through the performance of contracts. Contracts that require direct field administration are listed under the field manager, while contracts that can be controlled and administered without direct efforts by the field manager are listed under the procurement officer. Primary responsibility for the administration of characterization activities lies with the project engineer to whom the procurement officer and field manager report.

Figure 2 shows the system to manage the performance of work using geologic and hydrogeologic investigations as an example. The field activities for these investigations are supervised by the project geologist who reports to the field manager. Each of the activities is performed using technical specifications, project procedures, and/or contractor standard operating procedures for guidance. The field manager informs the project engineer of the performance (progress and quality) of work; he administers a field document control system, files, and forwards to the procurement officer all technical documentation and invoices for completed work submitted by contractors. The procurement officer forwards technical documentation submittals to the document control supervisor for project records. Technical submittals are distributed via the project engineer for review to determine if work, materials, etc. to which the submittals apply are in compliance with the contract.

Figure 3 illustrates the system of responsibilities for the technical review of information generated by characterization activities. Responsibilities are divided among groups of various disciplines. Disciplines most related to a characterization activity are responsible for its review. Review is complete upon concurrence by the project engineer and the project manager.

Figure 4 represents the total system for site characterization as it encompasses the scope of the previous figures

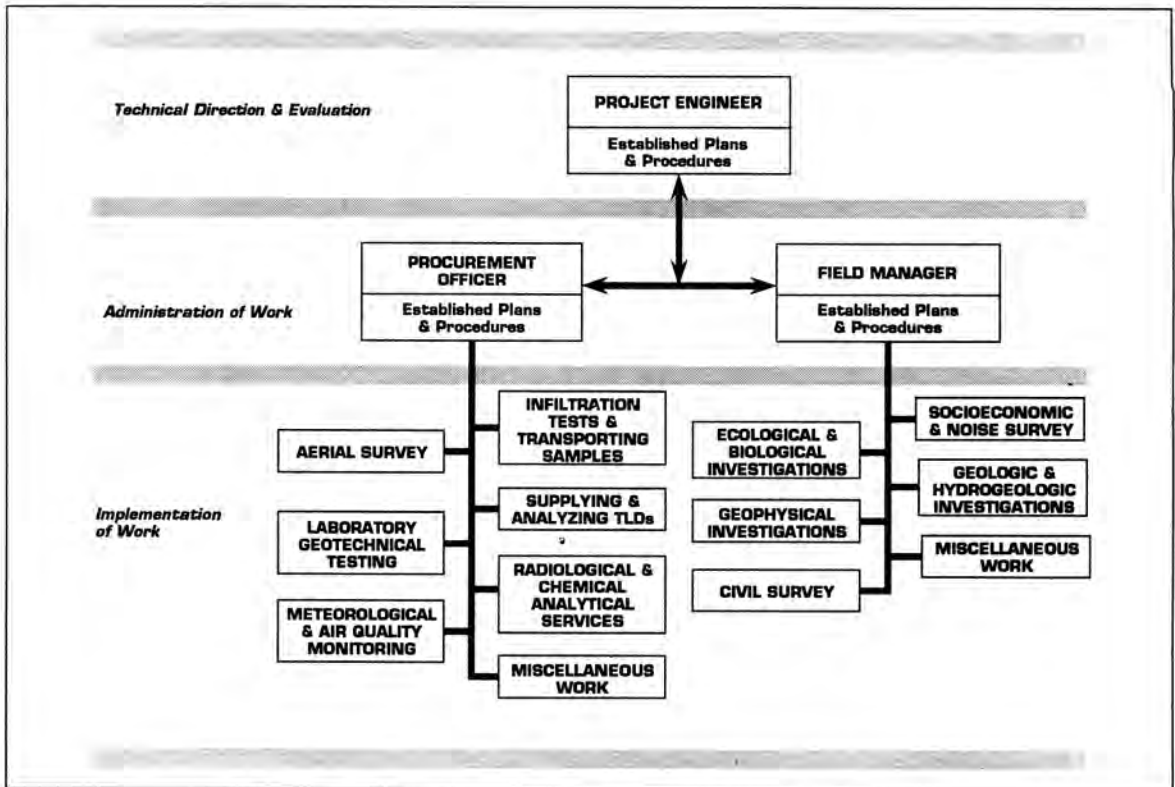


Fig. 1. Administration of Characterization Activities.

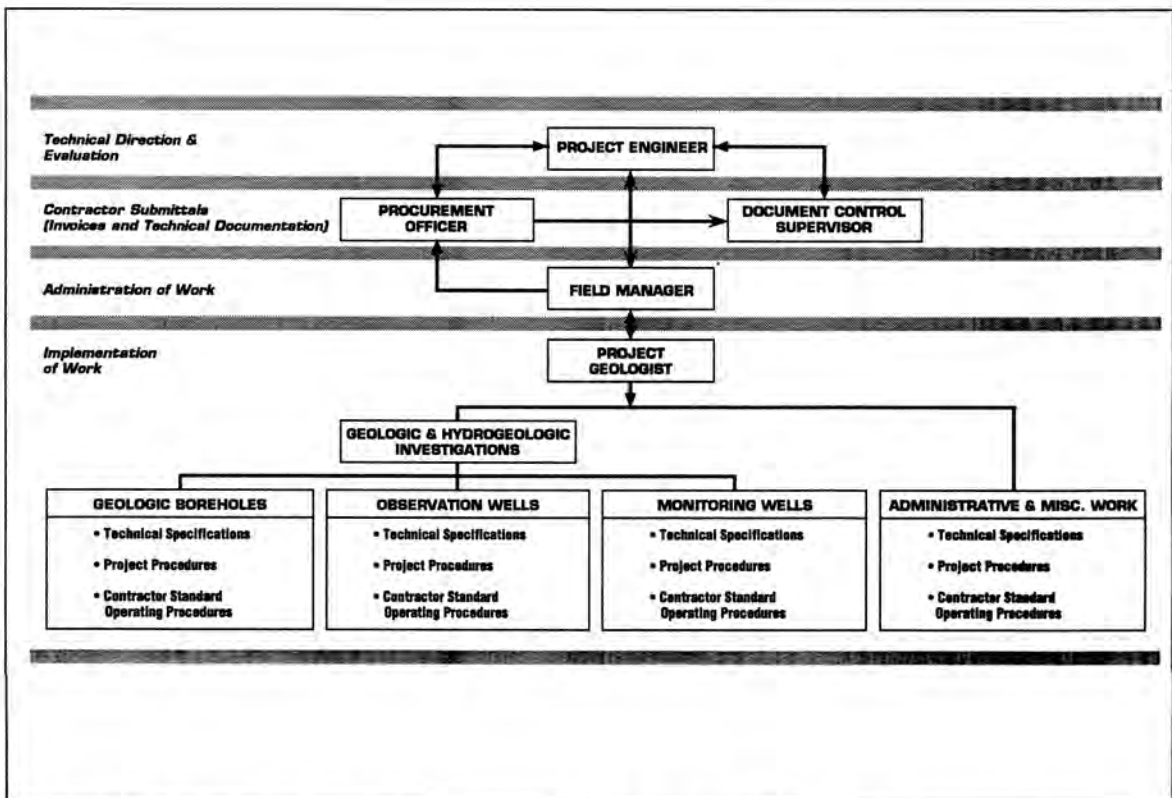


Fig. 2. Project structure for performance of work (geologic & hydrogeologic investigations).

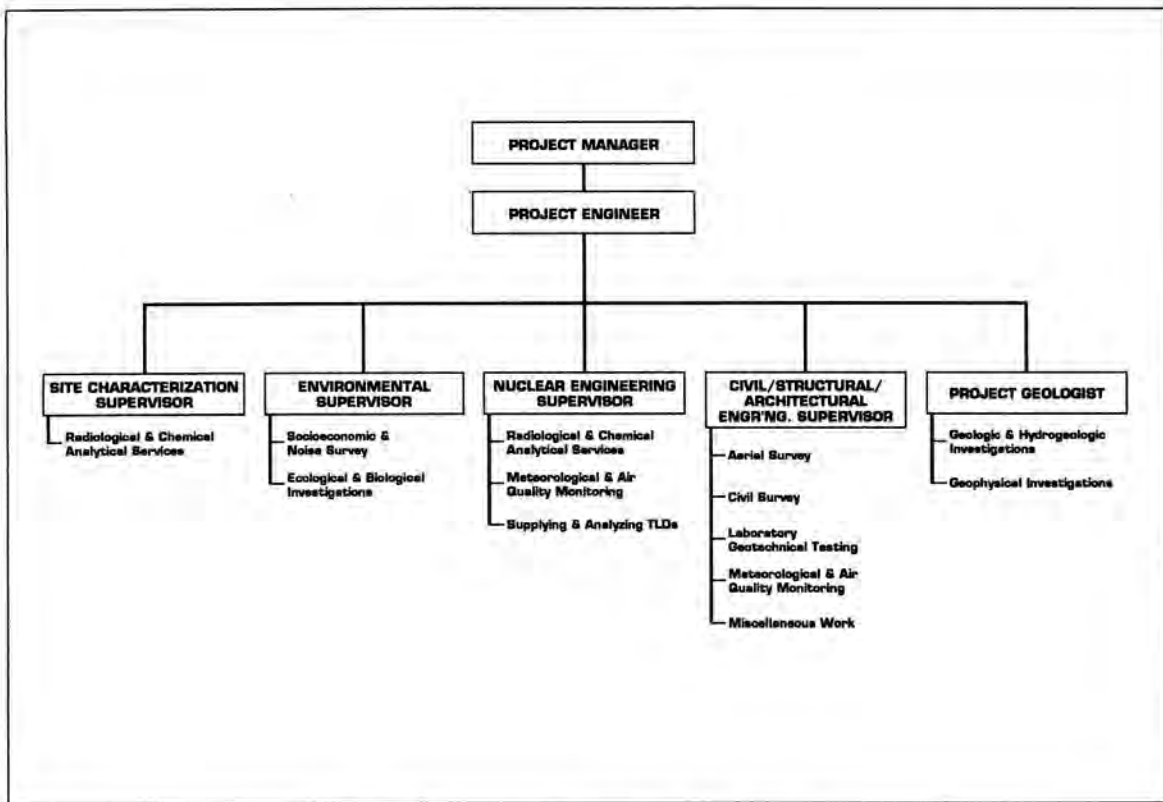
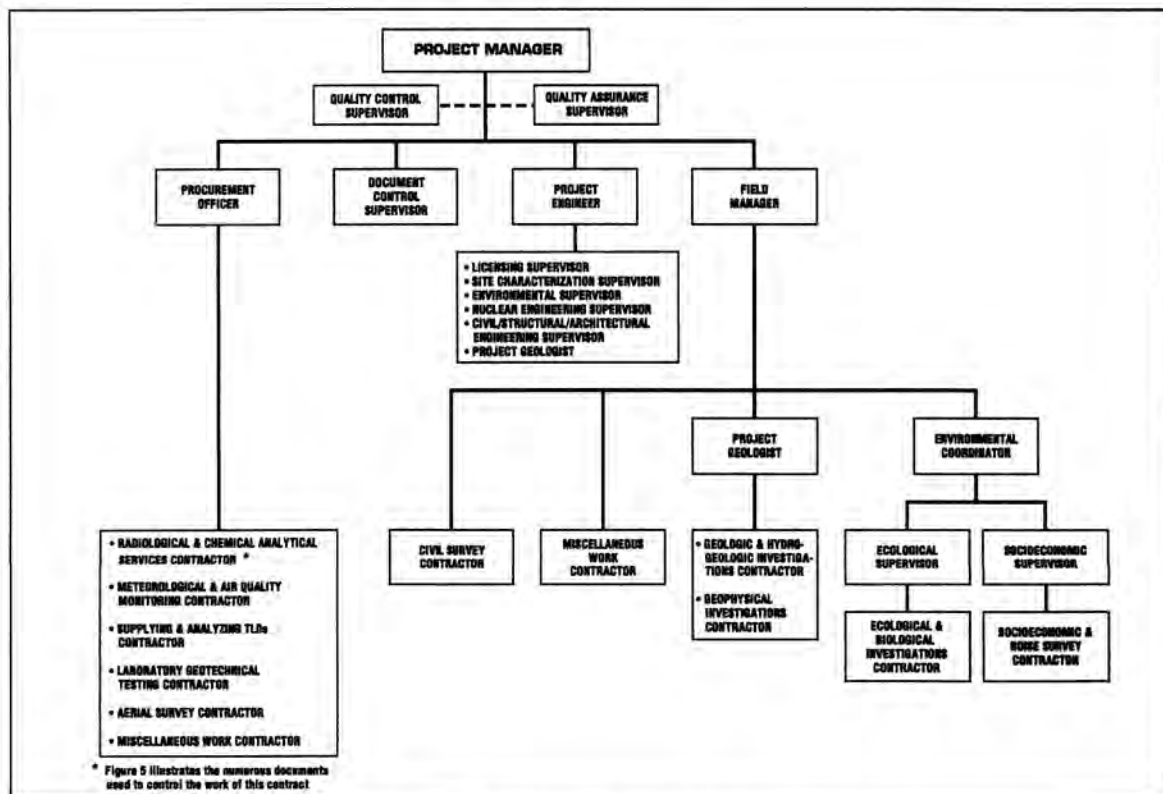


Fig. 3. Responsibilities for technical review.



* Figure 5 illustrates the numerous documents used to control the work of this contract.

Fig. 4. Organization of work.

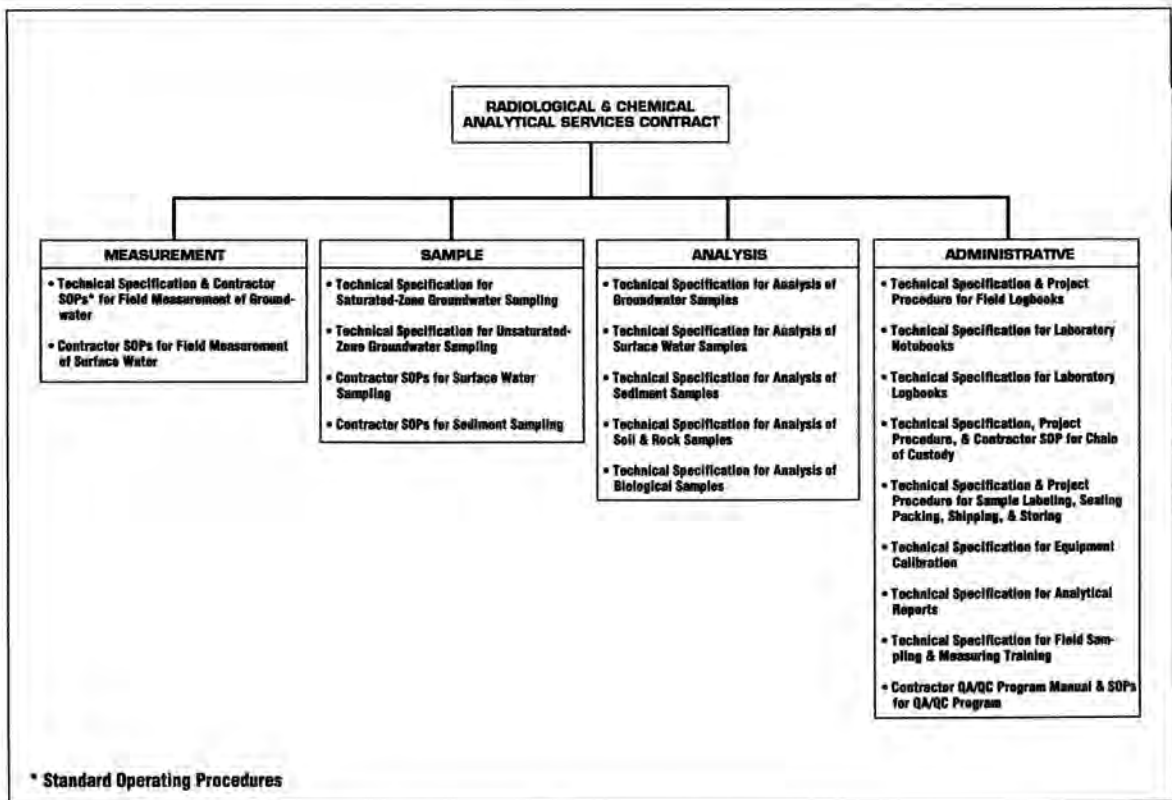


Fig. 5. Typical documents associated with a contract.

and details the flow of information for activities associated with a comprehensive characterization program.

Figure 5 delineates typical documents used to control the work of an analytical services contract that is one of many contracts for characterization.

CONCLUSION

Development of the graphic representation required management, administrative, and technical staff to review in detail their areas of responsibility and the reporting structures for administering contracts, for performing the work, and for controlling the flow of information. The process forced decisions related to precise organizational responsibilities, understanding how the work would be performed, technical management of the work, proper flow of generated information, and administration of contracts.

The completion of the graphic representation was more than a checklist for a readiness review. It became the means

to explain the system to the major administrative and technical staff and to identify the interactions necessary for the system to function. Thus, the strategy to determine if the requirements of the activity are identified and understood became the means to achieve detailed definition of all tasks and consensus among project staff.

REFERENCES

1. R.F. PATON, C.N. CAWLEY, and J.D. RINGENBERG, "Using a Regulatory Matrix to Identify Requirements and Evaluate Project Compliance," Vol. II, Proceedings, Waste Management '89, Tucson, AZ, 283-288 (1989).