

QUALITY ASSURANCE  
WILLIAMS AND ASSOCIATES, INC.  
JANUARY 20, 1987

The Williams and Associates, Inc. Quality Assurance Plan consists of the following four components:

1. Technical training and experience of the Associates.
2. Professional registration.
3. Relatively unique access to exceptional library facilities, including a government depository, as well as regular literature review and contributions to the hydrogeologic literature.
4. Peer review quality assurance/quality control procedures.

The first three components are required implicitly for professional credibility of individual professional associates and employees. These components also constitute a portion of the criteria used by Dr. Williams when selecting associates. The word "Associates" in the title of the corporation has a meaning that differs, in the case of Williams and Associates, from that of other firms with the word associates in the title. The management philosophy of the corporation is to rely on the ability of Dr. Roy Williams, President of the corporation, to assemble the maximum credible talent for any particular project and especially the waste repository hydrogeologic assistance project because of its professionally sensitive nature. This procedure acknowledges the appropriateness of the educational degree held by an individual as well as his formal coursework. Registration in a state as a Professional Geologist-Hydrogeologist or a Professional Engineer also is an important decision making tool for the selection of an associate. The extent to which an associate has published books or papers is an important criterion also. Dr. Williams has been able, primarily through personal contacts and familiarity with the profession, to maintain a group of very credible team members who are willing to list themselves as associates with the corporation and to be available on an as needed basis in order to accommodate the completion of contractual agreements.

Technical Training and Experience:

The Williams and Associates, Inc. quality assurance program begins with the technical training of the individuals comprising the teams. We have been careful to select team members with optimal formal coursework, training and degrees. Dr. James Osiensky, for example, has taken four formal graduate courses in hydrogeology. Technical training constitutes an important aspect of quality assurance. Such assurance is particularly necessary in the professional field of hydrogeology. Professionals who are familiar with this field realize that it is relatively easy for individuals with

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inappropriate training to portray themselves as hydrogeologists. Such individuals cannot provide quality assured work to the NRC. Such efforts most surely would be revealed during any type of intervention in NRC licensing action.

#### Professional Registration:

The second stage of the quality assurance program of Williams and Associates, Inc. consists of the selection of as many team members as possible who are registered in at least one state as either an engineer or a geologist-hydrogeologist. In some cases such registration is not appropriate (a statistician for example). In most cases these categories of training wherein registration is not appropriate constitute specific areas of support. We have selected enough team members who are registered to insure that we can provide credible expert witness testimony (defense) in support of NRC actions so that quality assurance can be achieved on the witness stand.

#### Library Facilities, Literature Review, and Contributions to the Literature:

The third stage of our quality assurance effort consists of our use of the readily available library facilities at the University of Idaho and the University of Texas as well as associates' contributions to the hydrogeologic literature.

In our opinion, quality assurance is difficult to achieve without the support of a library that subscribes to the appropriate journals. In two of the three cases mentioned above, the library also is a regional depository for federal documents. The availability of these facilities enables our team members to remain current on the latest publications in the fields of hydrogeology, hydrochemistry, geostatistics, structural geology, borehole geophysics, and the application of physical principles of groundwater flow to fractured porous media. In our opinion, it is not possible to remain current on pertinent topics in these disciplines without the availability of such facilities; similarly it is not possible to provide appropriate quality assurance without such facilities.

Various members of the team have contributed to several of the major journals that cover the field of hydrogeology. These journals include Ground Water, Water Resources Research, the Geological Society of America, the Journal of Hydrology, the International Mine Water Journal and the Journal of the American Water Works Association. Because several of these journals are refereed such publications by the Associates constitute an overall measure of quality assurance of their competence in the field. In addition to journal literature, several team members have published books in hydrogeology. These assertions can be documented by referring to the resumes of the associates.

Peer Review Quality Assurance/Quality Control for Document Preparation:

The last phase of the quality assurance program of Williams and Associates, Inc. consists of our peer review process for document preparation. This process is presented in schematic form in Figure 1; it also is described below.

In Step I of the document preparation process, tasks are assigned to the appropriate team members. The procedure by which work is assigned consists of consultation between project managers and Dr. Roy Williams with major input from the NRC project manager. Reviews of DOE documents constitute the majority of the products prepared for the NRC at this time in the DOE licensing process. The balance of the products consist of preparation of technical reports at the request of the NRC staff, reviews of NRC draft documents or the results of research on elusive concepts that impact licensing decisions.

In Step II of the document preparation process, one or more team members are authors of the subject technical report or document review. The hydrogeologists contributions are based on their technical skills and on their familiarity with the particular field sites; team members Kirk Steinhorst and Stan Miller provide statistical and geostatistical expertise, respectively.

In Step III.A, the project manager or assistant project manager reviews the work prepared by the contributing team members. This step of the quality assurance procedure has two important functions. The first function is that the project manager for the specific site studies the paper for content; he also edits according to his familiarity with the existing literature on that site. In those instances where he is not the primary reviewing author his review of the document also ensures his overall familiarity with each new document that is reviewed.

Step III.B of the peer review process consists of an optional review by Dr. Dale Ralston in the instances where the primary author of the document is the project manager who ordinarily would conduct the first quality assurance review. If Dr. Dale Ralston does not agree with an interpretation of one of the project managers, a conference is held to resolve the differences. If a controversy or disagreement develops, the final decision rests with Dr. Roy Williams. However the level of professional development of the associates (a primary criterion for the selection of associates) essentially precludes the development of irreconcilable differences among professionals.

Step IV of the peer review process constitutes the final review; Step IV is performed by Dr. Roy Williams. Concordant with the review performed by the project managers, this review step also has two functions. The first is to check the work based on Dr. Williams' overall hydrogeologic expertise, on his familiarity with all the potential high level waste sites and on his familiarity with the NRC High Level Waste Program in general. The second

function is to maximize his knowledge of the site testing based upon the contents of the document review. Dr. Williams always completes the final review with license hearing defensibility in mind.

After Step IV, the document is printed in final form with signature spaces for the primary authors and for Dr. Williams. This procedure semifinalizes the quality control aspect of the overall quality assurance process. The signature spaces on the first page of a document provide a summary of authorship and the fact that Dr. Williams has provided final approval.

In Step V of the peer review process the document is read and edited by Barbara Williams. The document is scrutinized for typographical errors and for clarity and content, particularly with respect to the incorporation of Dr. Williams' final review comments. After all errors have been corrected and the final document is signed by the author and by Dr. Williams, Barbara Williams then reproduces the first page of each document review in order to maintain an updated file and signature record of all documents. This file constitutes an easily accessible and current updated record of all documents prepared by Williams and Associates, Inc. as well as a record of the primary authorship of each document. Because a copy of the first page contains the signatures of the primary author and of Dr. Williams it summarizes Steps II through IV of the peer review process for quality assurance.

Step VI of the peer review process constitutes the final quality assurance-quality control step. After the final version of the document has been signed and submitted to the NRC, the Williams and Associates, Inc. computerized document lists are updated. This updating procedure is conducted by office manager Ms. Sue Line on an approximately monthly basis for each site. The site specific document lists contain all of the Williams and Associates, Inc. holdings of DOE, NRC, Williams and Associates, Inc. and other pertinent documents. After document reviews are completed, Ms. Line updates the list by denoting the titles of the newly reviewed documents with an asterisk. Subsequently, if a question arises about a document which has been prepared for the DOE High Level Waste Disposal Program, this list can be researched in order to 1) ascertain whether Williams and Associates, Inc. has a copy of that document, and 2) ascertain whether Williams and Associates, Inc. has reviewed the document.

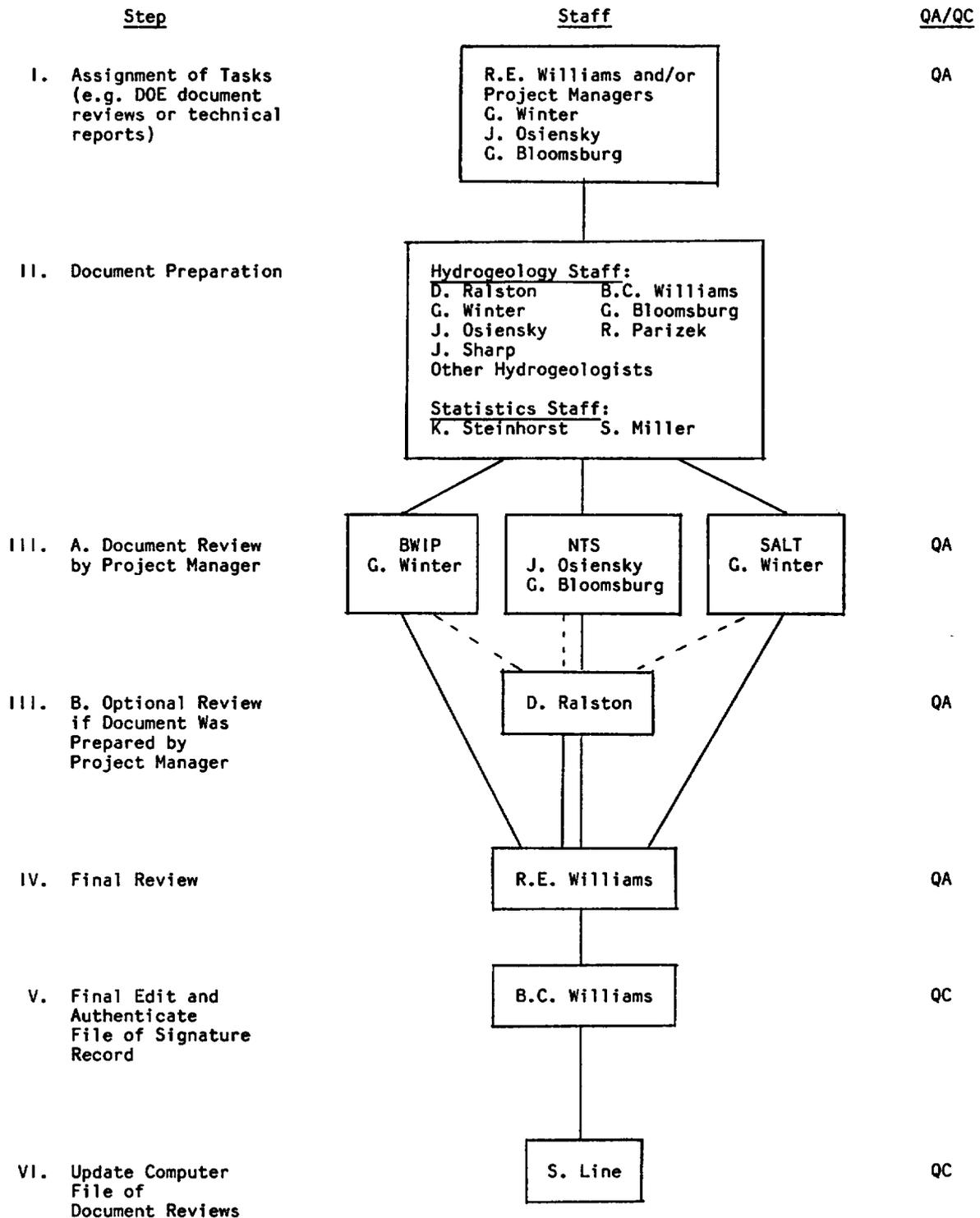


Figure 1. Peer Review for Document Preparation.