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UNITED STATES GENERAL ACCOUNTING OFFICE

WASHINGTON, D.C. 20548

CIVIL DIVISION

OCT 26 1971



Dear Mr. Hollingsworth:

The General Accounting Office has reviewed the actions taken by the Atomic Energy Commission (AEC) to provide for the development and implementation of adequate quality assurance programs in conducting its various activities. Our review was performed at AEC Headquarters, Germantown, Maryland; AEC's Chicago, Idaho, and Richland Operations Offices; and at contractor locations under the jurisdiction of these offices--Argonne National Laboratory, Argonne, Illinois; Atlantic Richfield Hanford Company, Richland, Washington; Douglas United Nuclear, Inc., Richland, Washington; Idaho Nuclear Corporation, Idaho Falls, Idaho; National Accelerator Laboratory, Batavia, Illinois; and WADCO Corporation, Richland, Washington.

With respect to the licensing of production and utilization facilities, AEC has defined quality assurance as comprising:

" *** all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material, structure, component, or system which provide a means to control the quality of the material, structure, component, or system to predetermined requirements."

The programs of the Divisions of Space Nuclear Systems, Naval Reactors, and Military Application have had formal quality assurance procedures for many years. For the past several years, AEC officials have emphasized the need for increased attention to and more effective application of quality assurance practices in reactor development programs to (1) help prevent costly expenditures due to deficiencies, (2) conserve materials and manpower, and (3) provide greater assurance of the successful achievement of program objectives.

In our report to the Congress, dated August 17, 1971, on the "Cost, Schedule, and Design Aspects of Selected Atomic Energy Commission Construction Projects" (B-164105), we pointed out that a quality assurance program was instituted and emphasized by the Division of Reactor Development and Technology (RDT) for the Loss of Fluid Test Facility project because of problems being encountered in the construction of certain other

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facilities. The report pointed out also that a quality assurance program was required as a result of disclosed quality deficiencies in the Power Burst Facility project.

In June 1969 RDT established formal quality assurance program requirements for all reactor development and test facility projects and associated processes, structures, components, and systems. In this regard, the Assistant Director for Engineering Standards, RDT, in remarks to the American Nuclear Society on September 1, 1970, stated that:

"Our experience had been that many important objectives of the Commission's reactor development programs were not being accomplished as predicted. This was attributable to severe problems, failures and delays due to insufficient engineering attention, much on essentially conventional or non-developmental materials, processes, components and systems. The fact that many of these programs involved research and development contributed to the difficulty; that is, there was a failure to draw the important distinction between uncertainties in technology together with the related risks of accomplishing the associated research and development programs, and the fundamental engineering elements of these same programs. The R&D risks are an inherent part of our business, but the engineering elements must be subject to prediction and control through proven engineering methods. In the field of research and development an essential ingredient of success is a systematic and ordered engineering approach utilizing exacting engineering standards and quality assurance practices. The same is true in the commercial application of nuclear energy; massive evidence can be advanced in support of this approach; based on economic considerations alone.

"Accordingly, within the Commission's reactor development programs, actions were taken to emphasize this approach and further strengthening actions are continuing. These importantly include requiring that technical criteria, codes and standards are defined and employed, and that recognized standard engineering practices are used."

Although quality assurance has been recognized by AEC to provide significant benefits, no specific requirements for the development of formal quality assurance programs have been established by AEC, with the exception of the four program divisions mentioned above. Several of the AEC operating contractors included in our review, however, have established formal quality assurance procedures while others have relied

on informal procedures for controlling the quality of their respective programmatic activities. Formal quality assurance procedures have been established by Argonne National Laboratory, Douglas United Nuclear, Inc., Idaho Nuclear Corporation, and WADCO Corporation. The benefits of such procedures identified by the various contractors included:

1. Management was made aware of potential problem areas in a more timely manner.
2. Management was assisted in meeting desired project requirements, which helped avoid potential losses.
3. Formal procedures helped to identify trends in operation and maintenance areas so that additional procedures could be established to improve or augment current practices.

The National Accelerator Laboratory, whose activities come under the Division of Research, and the Atlantic Richfield Hanford Company, whose activities come under the Division of Production, have, for the most part, adopted informal procedures for assurance of quality. On the basis of our review, it appeared that these informal procedures largely relied on the attitudes, efforts, and skills of the individuals involved in the programs to ensure that quality-related practices were being followed.

Although the Argonne National Laboratory had a policy requiring the implementation of formal quality assurance procedures, some of the operating groups at the laboratory whose activities come under the direction of Headquarters divisions that have not established quality assurance requirements were not implementing such procedures in the manner prescribed by Argonne.

In February 1969 Argonne established a policy that "to the fullest practical extent" formal quality assurance programs will be utilized by all laboratory operating groups to supplement existing quality practices. Quality assurance programs and plans were to be prepared by all operating groups and were to emphasize planned procedures to prevent quality problems. Also, the program and plans were to include procedures for prompt detection and correction of any conditions adversely affecting quality.

We noted that as of January 1, 1971, Argonne operating groups whose work was generally being funded by RDT were implementing formal quality assurance procedures while five out of eight Argonne operating groups whose work was being funded by AEC Headquarters divisions not requiring formal quality assurance procedures had not started preparing quality assurance plans. Also, the Argonne Quality Assurance Manager reported in early 1971 that several operating groups, including some funded by RDT, had not implemented, in some cases, those features of their quality assurance plans which called for (1) documenting items not meeting required specifications, (2) effectively controlling changes to engineering documents, and (3) performing internal quality assurance audits.

We have commented previously on the need for a formal quality assurance program at Argonne in our report dated February 18, 1970, to the Joint Committee on Atomic Energy on the "Development of the Janus Reactor Complex for Biological Research by the Argonne National Laboratory" (B-165117). In that report we pointed out that such a program, if properly conceived and implemented, should assist in preventing delays, cost increases, and performance problems of the type encountered in developing the Janus complex.

We believe that appropriate formal quality assurance procedures applied to such functions as procurement, construction, and fabrication of both nontechnical and technical items (1) provide management with a systematic basis for ensuring quality of products and (2) draw together the necessary techniques and practices that should be used to achieve the desired goal.

The development and implementation of quality assurance programs, however, requires a strong commitment on the part of management because of the (1) well-disciplined approach necessary to carry out a successful program and (2) cooperation needed from the people responsible for performing the planned actions. Although some AEC program divisions and their contractors have long recognized the merits of formal quality assurance, other program divisions have not required formal quality assurance programs for activities under their direction.

We believe that AEC could provide an incentive for greater application of formal quality assurance procedures by establishing an agency-wide policy on the development and implementation of quality assurance programs and by providing direction to the contractors as to the extent to which formal quality assurance procedures should be established for their various AEC programmatic activities.

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We would like to express our appreciation for the courtesies and cooperation extended to our representatives during the review. We would appreciate being advised of any actions taken or planned with respect to the matters discussed herein.

Sincerely yours,



Philip A. Bernstein
Assistant Director

Mr. R. E. Hollingsworth, General Manager
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