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NOV 30 1978

The Honorable Elmer B. Staats
Comptroller General of the
United States
General Accounting Office
Washington, D.C. 20548

Dear Mr. Staats:

In accordance with Section 236 of the Legislative Reorganization Act of 1970, the Nuclear Regulatory Commission is hereby submitting a statement on the Commission actions being taken with regard to the recommendations made by the Comptroller General of the United States in a report entitled, "The Nuclear Regulatory Commission Needs to Aggressively Monitor and Independently Evaluate Nuclear Powerplant Construction." The Commission's general response to the GAO report and specific responses to GAO recommendations regarding the NRC are enclosed. In summary, the NRC agrees with the basic thrust of the GAO report -- that the NRC inspection program should be conducted effectively and efficiently. In the course of the last year NRC has implemented a Revised Inspection Program approved by the Commission in June, 1977. The results of a preliminary evaluation of that program will be the subject of a report to Congress in January, 1980. The evaluation, which will get under way shortly, will encompass many of the issues addressed in the GAO recommendations. We intend to keep GAO informed of progress on this evaluation.

Sincerely,

Joseph M. Hendrie
Chairman

Enclosure:
Response to GAO Report

OCM OCA

No address

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The Honorable Elmer B. Staats
(Comptroller General of the United States)

11/30/78

Identical Letters sent to:

The Honorable John D. Dingell, Chairman
Subcommittee on Energy and Power
Committee on Interstate an Foreign Commerce
cc: Representative Clarence Brown

The Honorable Gary Hart, Chairman
Subcommittee on Nuclear Regulation
Committee on Environment and Public Works
cc: Senator James A. McClure

The Honorable Morris K. Udall, Chairman
Subcommittee on Energy and the Environment
Committee on Interior and Insular Affairs
cc: Representative Robert Bauman

The Honorable Abraham Ribicoff, Chairman
Committee on Governmental Affairs
cc: Senator Charles Percy

The Honorable Jack Brooks, Chairman
Committee on Government Operations
cc: Representative Frank Hoston

NRC Response to Recommendations in GAO Report EMD-78-80
"The Nuclear Regulatory Commission Needs To Aggressively Monitor
And Independently Evaluate Nuclear Powerplant Construction"

General Response

The Commission recognizes that the construction of a nuclear power plant is a complex task requiring extensive monitoring through inspection and evaluation to protect the health and safety of the public during subsequent plant operation. By regulation, NRC requires formal quality assurance programs on the part of its licensees and their contractors to provide extensive inspection and monitoring. In addition audit-type inspections are directly performed of the licensee and his contractors by the NRC, through its Office of Inspection and Enforcement. Inspections at power reactors under construction and at vendors supplying safety related compo[illegible]e but one measure which the Commission employs to assure t[illegible]ear power plants can be operated without undue risk to the he[illegible]th and safety of the public, to the environment or to security.

The underlying philosophy for safety of reactors is the "defense-in-depth" concept. This concept is implemented through the use of complementary and redundant equipment and systems. Consequently, this concept does not depend for safety on the achievement of perfection in any one system or component. Prior to issuance of a construction permit, the Office of Nuclear Reactor Regulation (NRR) determines whether the "defense-in-depth" concept has been implemented in the basic design of a reactor as required by NRC regulations and in accordance with licensee commitments in the safety analysis report (SAR). The Office of Inspection and Enforcement (IE) in turn assures that the NRC requirements and licensee commitments are be[illegible]ng met during construction, testing and operation. This is accomplished through a formal, structured and systematic audit-type inspection program. Inspections are made not only of the utility, but also of the major contractors and subcontractors.

Licensees are required by NRC regulations to perform inspections in much greater depth and scope than can be accomplished by IE and to establish controls to assure that these inspections are accomplished. Also, by regulation, licensees must require contractors and subcontractors to have quality assurance programs consistent with their own programs, including provisions for inspection. Licensees are required to assess contractor and subcontractor control of quality at intervals consistent with the importance, complexity and quantity of the product or services. This assessment may be performed by inspection, surveillance or audit. Similarly, contractors are required to assess the quality control of subcontractors. Thus, the NRC approach to the inspection of

reactor construction provides for multiple levels of inspection and verification or a layered approach. The inspection pattern is pyramidal with each level of activity verified, inspected or audited by those above. The IE inspection program is at the apex of this pyramid. IE inspections are not designed to duplicate or substitute for a licensee's management controls established as part of his quality verification system. Rather, IE inspections, as the last in the multiple levels of inspection, are aimed at assuring that the systems required of the licensees and their contractors are implemented to provide appropriate quality.

The NRC agrees with the basic thrust of the GAO report--that we should inspect more effectively and efficiently. The GAO concerns are characterized by NRC to include:

. NRC should lessen its dependency on licensees by:

  - More direct NRC independent measurements
  - More direct observation of activities by NRC
  - More direct communication by NRC with licensee and contractor workers
  - More vendor inspectors

. NRC should modify the use of inspector's time and skills by:

  - Changes in documentation and reporting
  - Organization separation of routine inspection work from investigations ("reactive" work)
  - More attention to detail
  - Relieving the inspectors of work beneath their skill level

Over its history, the NRC has examined its inspection function for ways to improve its efficiency and effectiveness. This examination has been intensified over the last two years with comprehensive studies of inspection practices. The studies are largely completed and NRC is initiating changes in its program based on these studies. The most notable changes under implementation are included in what is termed the Revised Inspection Program. This program, when implemented, will:

- Increase the time NRC inspectors are at the licensee sites principally through use of resident inspectors at operating reactor sites and selected construction sites.

- Increase direct verification of licensee activities by NRC inspectors. This includes both independent measurement by NRC and direct observation by NRC.

- Provide for a performance appraisal program on a national level by NRC. This program will appraise licensee performance, the effectiveness of the NRC inspection program and inspector objectivity.

- Improve manpower management.

The Revised Inspection Program, when fully implemented, should provide more direct NRC independent measurements, more direct observations of activities by NRC, and the opportunity for more direct communications between NRC and licensee workers--matters of concern to GAO--without large increases in manpower. The basic goal behind the Revised Inspection Program was to increase NRC presence at sites. Since NRC did not receive the resources requested of OMB in the FY '79 budget, which would have permitted resident inspectors to be assigned to all sites under construction, NRC plans to assign its construction resident inspectors during the last three years of construction, as this is the most cost-effective use of these limited resources. Other construction sites and vendors will continue to be inspected from NRC regional offices.

In the vendor program, NRC has a trial underway utilizing ASME inspectors as "third party" inspectors. Under this program NRC is testing the viability of accepting the results of ASME inspections in lieu of direct NRC inspections. The ASME inspections are subject to audit by NRC. Assuming the success of the trial program, the efforts of the approximately 300 ASME inspectors can support the NRC vendor inspection program without large increases in NRC resources. We have opened discussions with IEEE to explore a similar arrangement with IEEE. Any third party arrangement with IEEE is years from testing or implementation.

The NRC acknowledges the GAO concerns about use of inspector's time and skills. We do not totally agree with the level of these concerns nor the GAO recommendations to allay the concerns, although we will include further assessment of these concerns and recommendations in our upcoming evaluation of the Revised Inspection Program.

Each GAO recommendation is discussed in the attachment "NRC Specific Response to GAO Recommendations--GAO Report EMD-78-80."

NRC Specific Response to GAO Recommendations
GAO Report EMD-78-80

A. GAO Recommendation Chapter 2 Number 1, 2 and 3 (p. 11)

We recommend that the Chairman, NRC, continue to expand the scope of NRC's inspection effort and supplement its current practices by

--- (1)* increasing the number of representative tests of safety related equipment and systems to evaluate their quality;

--- (2) performing a greater number of evaluations of tests, engineering analyses and other analytical work now performed by the utilities or contractors;

--- (3) increasing surveillance effort at construction sites.

NRC Response

We have considered the above three recommendations as an overall recommendation that NRC do more to independently assess the quality of work done by its licensees and their contractors so that NRC is less dependent on information furnished by its licensees. NRC, in its evaluation of its inspection program, early identified that independent verification by its inspectors should be increased. Actions are already underway as part of the Revised Inspection Program approved by the Commission in June 1977 to provide for this.

NRC's current inspection program is a structured, coherent effort, which has been developed through the years. It covers the areas of nuclear power plant construction which both judgment and experience have shown to be the most important. The program is solidly founded on the principles of Quality Assurance. Quality Assurance requires first, that work be done right. For this reason we examine instructions and drawings on a spot check basis to see whether they accurately reflect license requirements and whether they provide sufficient guidance to produce good work. Then we observe work in progress to see whether the instructions are being followed. Lastly, we examine records, both of work observed, and work not observed. Checking the records of work we have witnessed enables us to judge the accuracy of the record keeping system, and the validity of records of work we have not witnessed. Hence, although the actual performance of the work is important, the "paper work" in preparation for the actual work performance and the records of work are of importance in attesting to work performance. As we

* GAO did not number their recommendations. We have numbered their recommendations consecutively from 1 to 22 as indicated by this number.

inspect, the observation of actual work is accomplished in a relatively brief time span; examination of the control documents and records --- important in truly assessing the actual work performance --- is somewhat more time consuming. In our Revised Inspection Program, we are increasing the amount of direct observation by our inspectors of work underway. For example, on-site inspection time for reactors in construction at double unit sites will increase from the present average of approximately 430 hours per reactor per year, accomplished through efforts of a number of regionally based inspectors, to approximately 780 hours per reactor per year for double unit sites with resident inspectors (presently planned for operating reactors and reactors in late construction). Much of this increase in on-site inspection time will be devoted to surveillance, observation and evaluation of work.

An additional method of independent verification we are evaluating is confirmatory or independent measurements. These differ from direct observation in that they include "hands on" inspections rather than observing the licensee or his contractors perform his scheduled work. After the licensee or his contractor has performed the work, tested (such as radiography) and documented the acceptance of the work, the NRC, on a highly selective basis, will have tests reperformed to determine whether the "confirmatory measurement" confirms the tests previously performed and documented by the licensees. If this technique is viable, we believe a small sample will provide valuable insights into the technical performance of the licensee and in the accuracy and completeness of licensees' documentation.

In addition to the routine preventive inspection program described above, a significant fraction of NRC inspections intended to assure plant safety is reactive in nature. NRC has requirements for licensees to report matters potentially affecting safety via such methods as Part 21 Reports (10 CFR 21), Construction Deficiency Reports (10 CFR 50.55(e)) and Licensee Event Reports. These or any other reported matters are followed up on by reactive inspections until satisfactory resolution of the actual or potential problem is achieved. Examples of recent problems handled through such reactive inspections are BWR piping cracks, qualification of electrical connectors and penetrations, BWR containment, PWR steam generator and ECCS capability problems. Similarly, allegations of problems or wrong doing are pursued by NRC investigative efforts to determine if corrective actions are needed.

The NRC's use of increased independent verification will continue as a part of its audit approach. The NRC verifications in no way substitute for the detailed, rigorous inspection programs required of NRC reactor licensees. NRC believes that its current inspection

program is effective and has contributed significantly to the excellent safety record of the nuclear power industry. Nevertheless, we continue to examine the inspection program for ways in which it can be improved.

B. GAO Recommendation Chapter 2 Number 4 (p. 11)

We recommend that the Chairman, NRC, continue to expand the scope of NRC's inspection effort and supplement its current practices by

--- (4) initiating formal, private interviews with craftsmen at construction sites;

NRC Response

The NRC has implemented several measures over the last several years to increase the accessibility and visibility of the NRC inspectors to craftsmen or any other site personnel who may have concerns they wish to discuss. Inspectors now wear distinctive apparel. Licensees have been requested to post instructions at construction sites informing workers of how to contact NRC. NRC telephone numbers have been listed in local telephone directories. We continue to seek additional ways to open channels of communication to concerned workers and citizens.

The NRC has not, as a part of its preventive (routinely scheduled) inspection program, conducted formal, private interviews with craftsmen. It regularly conducts formal interviews during investigations which are conducted when there are allegations, specific requests as from Congress or reason to suspect problems of a nature which might not be detected during regular inspections or when there are circumstances where additional information is needed.

NRC recognizes that discussions with workmen have a value and, consequently, uses this technique. As the GAO audit established, NRC inspectors do often speak to craftsmen relative to particular inspection activities but not in a random manner to obtain general information of the craftsmen's knowledge of errors and deficiencies. The NRC inspection approach is to discuss each item or area inspected with knowledgeable licensee or contractor personnel including craftsmen if appropriate, at the time of the inspection. Since our manpower resources are limited, careful consideration must be given to allocation of the NRC inspector's time.

We will continue our efforts to publicize our availability and receptiveness to private discussion as a means of obtaining significant information from concerned individuals. We will further assess the random interview technique recommended by GAO as a part of our evaluation of the Revised Inspection Program. If merited, the technique will be incorporated into the preventative inspection program on a planned basis.

C. GAO Recommendation Chapter 2 Number 5 (p. 11)

We recommend that the Chairman, NRC continue to expand the scope of NRC's inspection effort and supplement its current practices by

--- (5) promoting quality assurance at construction sites by requiring training in quality assurance for construction craftsmen and observing and evaluating the training given.

NRC Response

We understand the GAO recommendation to mean that the NRC should require "---that construction workers are given adequate training by their employers on the value of quality construction---" (p. 11). NRC agrees with this recommendation. We believe that current requirements and guidance can be interpreted to permit an expanded scope for licensees' construction workers training in quality assurance. Consequently, as a result of the GAO recommendation, IE will review the implementation of current licensee training programs and ascertain whether construction craftsman are trained in those areas of quality assurance applicable to their craft. Inspection procedures will be revised, if needed, to increase inspection of these training activities.

The responsibility for conducting training of all types including quality assurance rests with the licensee and his agents. Provisions for conducting such training must be included in quality assurance programs in order to satisfy Criterion II of 10 CFR 50, Appendix B. Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)," by endorsement of ANSI Standard N45.2, "Quality Assurance Program Requirements for Nuclear Facilities," and WASH 1283 (Revision 1), "Guidance on Quality Assurance Requirements During Design and Procurement Phase of Nuclear Power Plants" provides additional guidance on training of personnel. These documents have been used by the NRC staff in the evaluation of applications for construction permits. In this regard Chapter 17, "Quality Assurance," of Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," states the PSAR should describe how the indoctrination and training program will assure that:

1. Personnel performing activities affecting quality are appropriately trained in the principles and techniques of the activity being performed.

2. Personnel performing activities affecting quality are instructed as to purpose, scope, and implementation of governing manuals, policies, and procedures.

3. Appropriate training procedures are established.

The above elements are reviewed by NRR and must be found to be acceptable prior to issuance of a construction permit. (The Standard Review Plan, Section 17.1, establishes the above elements as part of the acceptance criteria for an acceptable quality assurance program.)

D. GAO Recommendations - Construction Program Chapter 3 Number 6, 7, 8 and 9 (p. 23)

To correct weaknesses in inspection performance and reporting practices, we recommend that the Chairman, NRC

--- (6) change reporting procedures to require a more extensive scope section and more detail on deficiencies noted;

--- (7) revise the internal review process to minimize report errors and to insure adequate investigations of report items;

--- (8) not close deficient items until licensees can demonstrate proper completion of approved corrective action; and

--- (9) obtain and maintain sufficient documentation to adequately support the inspector's reports.

GAO Recommendations - Vendor Program Chapter 4 Number 19, 20 and 21 (p. 30)

To improve its inspection performance and reporting practices, we recommend that the Chairman, NRC

--- (19) expand NRC's reporting procedures to require a more extensive scope section and more elaboration on deficiencies noted;

--- (20) not close deficient items until vendors have demonstrated proper completion of approved corrective action; and

--- (21) obtain and maintain sufficient documentation to adequately support the inspection reports.

NRC Response

Three recommendations on reporting are common between Reactor Construction and Vendor Programs. A fourth item listed under Reactor Construction is assumed to apply equally to the Vendor Program since the same IE policy and procedures apply to both. For this reason the NRC responses to these GAO recommendations have been combined.

General

Before discussing the specific recommendations, it is useful to consider the purposes of the inspection report and other documentation of inspection results. The purposes of the inspection report are to: (1) convey the inspection results to the licensee or vendor; (2) provide a basis for enforcement actions when appropriate; (3) provide information for the management of the inspection program within the Office of Inspection and Enforcement; (4) provide a means of disseminating information regarding identified technical problems to other NRC offices; and (5) provide information to the general public.

Other records are used by NRC in documenting inspection efforts, especially in satisfying the need for information for the management of the inspection programs. These include a computerized record of identified noncompliance items and status of completion of inspection requirements. The inspection requirements are expressed in a procedures manual so that a specific inspection procedure, identified as a "module" exists for each major construction activity such as welding of safety related piping and installation of electrical cables and instrumentation. There are currently 119 inspection modules pertaining to reactor construction plus one module which is independent inspection effort. The independent inspection effort module was developed to assure that sufficient time was allotted in the programs for inspectors to exercise initiative in selecting and pursuing inspection areas outside a detailed inspection program. IE has had a report format in the past that provided a more complete documentation of inspections. This report required a large expenditure of inspector effort without a corresponding increase in assurance of plant safety. Therefore, in response to a GAO recommendation in an August 18, 1972 report on the materials inspection program, IE streamlined its documentation techniques to increase the time available for performing additional inspections.

Specific Response

GAO Recommendation #6 and #19

1. Reactor Construction

--- (6) change reporting procedures to require more extensive scope section and more detail on deficiencies noted;

2. Vendor

--- (19) expand NRC's reporting procedures to require a more extensive scope section and more elaboration on deficiencies noted.

NRC Response

The two recommendations are considered to be identical for the reactor construction and vendor inspection programs. The NRC will continue to optimize the level of documentation of inspection results against the manpower expenditure for documentation. Instructions will be provided to inspectors to clarify reporting requirements regarding the scope of inspections. The Manual Chapter on enforcement is currently under revision. This revision will require inspectors to provide additional details for deficient items, specifically with regards to providing clearer evidence of noncompliances with regulatory requirements and to describe mitigating circumstances associated with a noncompliance.

GAO Recommendation #7

1. Reactor Construction

--- (7) revise the internal review process to minimize report errors and to insure adequate investigations of report items.

NRC Response

Although this recommendation was directed only toward the reactor construction program it is assumed to apply equally to the vendor program. The existing internal review process consists of a review by the inspector's immediate supervisor, (Section Chief) and a review by the appropriate Branch Chief. The review is primarily for the purpose of assuring appropriateness of proposed enforcement actions and to review technical problems. The inspectors are currently, and must continue to be responsible for accuracy of their own reports. NRC will emphasize the responsibility of the inspectors and supervision in the revised procedure on inspection reports through an explanation of the purpose of the various signatures on an inspection report. In addition, there are current IE training programs which should improve inspector's performance in this area, especially the new "Techniques of Inspection" course.

While the GAO did find a number of report errors, upon review of these, IE found that nearly all such errors were unimportant. Certain of the errors, however, do indicate a need for greater accuracy in documentation of inspection results. Measures are being initiated to reduce these errors consistent with efficient utilization of NRC resources. These measures will be assessed to assure their effectiveness.

GAO Recommendation #8 and #20

1. Reactor Construction

--- (8) not close deficient items until licensees can demonstrate proper completion of approved corrective action;

2. Vendor

--- (20) not close deficient items until vendors have demonstrated proper completion of approved corrective action.

NRC Response

Closure of "deficient items" is a subjective determination in many instances. Deficiencies are not closed out by inspectors based on licensee or vendor promises. An item involving hardware changes over a considerable length of time may be closed out before all such changes are completed if the inspector ascertains that the deficiency causing the changes has been identified and corrected and the completion of the changes is under the control of systems provided in the quality assurance program. NRC believes existing policy is appropriate and will clarify the existing policy to inspectors to assure proper implementation.

GAO Recommendation #9 and #21

1. Reactor Construction

--- (9) obtain and maintain sufficient documentation to adequately support the inspector's reports;

2. Vendor

--- (21) obtain and maintain sufficient documentation to adequately support the inspection reports.

NRC Response

NRC construction and vendor inspectors are well experienced professionals who, over the years, have developed individualistic means of gathering primary information that serve as a basis for inspection reports. These may vary from fairly extensive written information to very sketchy "reminders". NRC considers the report to be the record of the inspection and, hence, has avoided requiring "field notes." Consequently, we consider the primary notes taken to be an aid to the inspector in the preparation of the report. Currently, these primary notes enjoy no agency status -- they may be retained or discarded as the inspector desires. We are reluctant to give status to the "field notes" since, we believe, the inspectors may consider that they should devote care and attention in their preparation so as to be understandable to a third party. This we believe would take time away from inspection itself. As an effort toward increased accuracy, we will request licensees to comment on factual accuracy when the licensee performs his review of the report for proprietary information.

We also believe that document collection by inspectors would take time away from inspection itself without real benefit, particularly because licensees already maintain and provide extensive documentation to the NRC.

E. GAO Recommendation Chapter 3 Number 10 (p. 23)

To increase its inspection productivity, we recommend that the Chairman, NRC

--- (10) increase the time the inspectors spend performing inspection work at construction sites.

NRC Response

The NRC has had efforts underway for some time to increase the on-site time of its inspectors --- these efforts were intensified within the last two years by the establishment of numerical goals. A driving force behind the Revised Inspection Program, which includes resident inspectors, was the desire to obtain more on-site time.

IE currently has a goal for inspectors stationed in the Regional Offices that 30% of their regular working hours be spent on on-site inspection. In FY 1978, IE data systems showed actual time spent on-site varied between 27-28%. (GAO reported 22%). Nevertheless, the 30% on-site inspection goal remains an objective for FY 1979 - FY 1984 as indicated in IE's most recent budget request. In our view the 30% number may represent an upper limit for region-based inspectors.

During FY 1978, IE began the implementation of a resident inspection program by placing 8 resident inspectors at sites with reactors in the construction or preoperational testing phase. Current plans are to increase this number at these type sites to 15 in FY 1979, 18 in FY 1980 and 37 in FY 1981. The direct on-site inspection goal for resident inspectors is 55% in FY 1979 increasing to 60% in FY 1984 as work procedures become more efficient.1/

1/ It should be noted that the on-site inspector must spend part of his time away from the work or operations areas on-site in report writing, training, consulting with his supervising office and in interface activities with other NRC organizational elements.

F. GAO Recommendation Chapter 3 Number 11 (p. 23)

To increase its inspection productivity, we recommend that the Chairman, NRC

--- (11) evaluate its inspection practices to determine if clerks and paraprofessionals can be used effectively to aid the inspectors.

NRC Response

The NRC, in response to this recommendation, has in progress a survey of its inspector staff to identify precise areas where improvement may be obtained. We particularly are concerned about use of inspectors for "clerical" activities as reported by GAO. Based on the results of the NRC survey, specific actions will be taken as appropriate.

There are actions which may be viewed by some inspectors as administrative or clerical which are required of them for specific purposes. As a part of the documentation of inspection results, computer files are maintained. In order to assure accuracy of input, the inspector is required to prepare the input sheet. We consider this part of the documentation of the inspection results and efficiency and effectiveness require primary input from the most knowledgeable individual - the inspector. The regulations and the license docket files are basic references for inspections. The NRC Inspection and Enforcement Manual is the basic guide for inspection performance. Inspectors are expected to be very familiar with those basic references and guidance. Experience has taught us that an effective method to assure that inspectors stay abreast of changes is to require that they personally maintain their work copies of these references. This maintenance could be considered clerical work -- we do not consider it so.

G. GAO Recommendation Chapter 3 Number 12 (p. 23)

To exercise its policy of investigating all allegations of irregularities at nuclear power plants, but to do so in a manner which is not disruptive to the programmed inspection effort, we recommend that the Chairman, NRC

--- (12) review organizational elements and seek additional staff to investigate allegations more efficiently;

NRC Response

The NRC disagrees that organizational elements different from those used for regular preventive inspections should be used for investigations to improve efficiency. Investigations of allegations against licensees and contractors are most efficiently and effectively performed by regular inspection staff familiar with the site, plant, personnel, and procedures in use. It should be noted that current practice is to utilize trained investigators to assist the assigned inspector when non-technical questions are involved in an investigation. Specially qualified technical specialists also are used if an investigation requires such talents. These personnel however, also perform other preventive inspection duties thereby enabling full use of their time and talent and assuring that they remain abreast of requirements and industry practices. NRC believes that when these specially qualified personnel are made a part of an investigative team under the guidance of a site oriented inspector, optimum efficiency is obtained and minimal interference in the routine program occurs. Investigations that include serious allegations or involve high priority areas will be performed by performance appraisal staff. Allegations against NRC personnel are investigated by the Office of Inspector and Auditor.

H. GAO Recommendation Chapter 3 Number 13 (p. 23)

To exercise its policy of investigating all allegations of irregularities at nuclear power plants, but to do so in a manner which is not disruptive to the programmed inspection effort, we recommend that the Chairman, NRC

--- (13) expedite efforts to develop a rule or regulation to protect workers from being fired because they have brought safety concerns to NRC's attention.

NRC Response

The NRC agrees with the need to protect workers who have provided information on safety concerns at nuclear power plants. We believe the Bill S.2584 and related regulations in conjunction with existing authority and regulations will provide adequate protection of these employees.

Since this recommendation was made, S.2584 has been passed by the Congress and signed by the President. This bill provides a mechanism for protecting workers from being discriminated against because of bringing safety concerns to the attention of the NRC.

I. GAO Recommendation Chapter 4 Number 14 and 15 (p. 29)

We recommend that the Chairman, NRC, improve NRC's basis for vendor inspection by

--- (14) developing criteria and procedures to identify all vendors of safety-related components and include them in the list from which vendors are selected for inspection,

--- (15) initiating a statistical method for selecting vendors for inspection which will improve the basis for projecting inspection findings to the nuclear component supplier industry.

NRC Response

The NRC agrees with these recommendations. An NRC study also identified these as actions which should be taken.

Currently, the selection of suppliers to be inspected and the frequency of the inspection is based on the safety importance and quantity of the product or service supplied and the history of performance of the suppliers' products. In addition, vendors are identified for inspection as a result of current problems experienced with their products. Vendors are identified by ASME N-stamp holder listings, contact by the NRC with vendors, and through contacts with licensees.

The NRC has under development an integrated and automated system to aid in the selection of vendors for inspection. Currently, we plan for this system to contain the following elements: listing of all known vendors of nuclear identified equipment and components; volume of nuclear work for each vendor; relative safety impact of the products of vendors; in-service failure experience of products; NRC inspection experience; and random selection of vendors for inspection. We believe our current judgment selection method (even when based on an automated system) should continue to select the large majority of vendors for inspection. However, we agree that a portion of the vendors should be randomly selected so that any vendor to the nuclear industry has an opportunity for inspection.

J. GAO Recommendation Chapter 4 Number 16 (p. 29)

We recommend that the Chairman, NRC, improve NRC's basis for vendor inspections by

--- (16) working with the nuclear industry to promote the development and adoption of adequate standards for manufacturing all safety-related non-ASME components,

NRC Response

NRC agrees with this recommendation and is taking actions to promote development of such standards.

The NRC -- and AEC regulatory -- has for years recognized the importance of standard development and improvement. The NRC has an active program for encouraging and assisting industry in the development of standards in all safety important areas including electrical and instrumentation. For example, IEEE is presently developing a standard (IEEE P-467) which is intended to provide quality assurance program requirements specifically for the design and manufacture of Class 1E instrumentation and electric equipment.

NRC is active in the national standards process from the very beginning when various topics for standards are identified and priorities assigned. Participation of NRC in a specific standards writing group is based on the safety importance of the topic, however such participation in no way commits the NRC to accept or use the end product. Rather the decision as to whether or not the end product is acceptable is made only after an extensive in-house review of the adequacy of the standard.

GAO has indicated that one of the reasons that electrical and instrumentation manufacturers were not as heavily inspected was the lack of suitable standards. Improved industry standards would make inspections of non-ASME vendors easier in certain phases of inspection but the lack of more definitive standards has not been a reason for not inspecting these types of vendors. Adequate bases for our inspections exist in 10 CFR 50 Appendix B, ANSI N45.2, and IEEE and ANSI technical standards which are imposed by purchasers (either licensees or their primary vendors) through their purchase orders and contracts with these vendors.

K. GAO Recommendation Chapter 4 Number 17 (p. 29)

We recommend that the Chairman, NRC, improve NRC's basis for vendor inspection by

--- (17) inspecting non-ASME vendors in a manner that reflects their importance to the safe operation of nuclear power plants.

NRC Response

We believe the NRC already selects non-ASME vendors in this manner. The vendor program inspects all nuclear architect engineers and nuclear steam system suppliers with active nuclear projects because of their impact on safety. AE/NSSS organizations are first tier vendors who act as the licensee's agent in procuring most components from lower tier vendors. This includes providing design specifications and quality requirements. Through the inspection of AE/NSSS firms the NRC vendor program achieves strong influence on most lower tier vendors in the areas of design, procurement, sub-vendor audit and surveillance, and other AE/NSSS functions.

GAO reports that instrumentation suppliers are being neglected by NRC inspection efforts. The low degree of attention given instrumentation suppliers is based on the relative safety importance of this type of equipment as compared to the mechanical pressure boundary components. Instrumentation and process control equipment is important and safety-related, however in nuclear designs, redundancy (duplication) is required, thus failure or malfunction of a single device will not imperil the total facility or the public. Further, this equipment is usually designed for the "fail-safe" situation, therefore failures and malfunctions can be more easily tolerated than failure of the reactor pressure vessel or the primary piping system components. On this basis inspection of electrical/instrumentation equipment suppliers has been given a lower priority than mechanical, pressure boundary type components.

IE has recognized the relatively low attention given to electrical/instrumentation suppliers. An alternative method to direct NRC inspection is being pursued. This method proposes to utilize third parties, such as professional societies, to supplement the direct inspections of the NRC. IE initiated a two-year trial program starting in June 1977 with the American Society of Mechanical Engineers (ASME) to test the feasibility of using third-party

inspection systems to supplement the vendor inspection program. The present ASME inspection system utilizes over three hundred inspectors who inspect against quality assurance requirements compatible with those of the NRC and who are audited by the NRC. Thus, NRC influence is greatly expanded without significant increases in the NRC inspection staff. A similar proposal has been discussed with the Institute of Electrical and Electronic Engineers Society (IEEE) to cover the electrical/instrumentation equipment manufacturers.

L. GAO Recommendation Chapter 4 Number 18 (p. 29)

We recommend that the Chairman, NRC improve NRC's basis for vendor inspection by

--- (18) seeking Office of Management and Budget approval to hire more inspectors for the vendor inspection program.*

NRC Response

The current vendor program is the minimum that is capable of providing both preventive and reactive inspections and continued participation in the third party trial program with the ASME. The NRC vendor inspection program has been under intense review as a part of the budget process, by both OMB and the NRC. In this regard, the NRC has recently completed a staff study which has been forwarded to OMB for their review. One of the principal conclusions of this report is that the NRC should not request an increase in positions from OMB until the results of the trial, third-party inspection program with ASME can be fully assessed.

The NRC and the American Society and Mechanical Engineers (ASME) have agreed to engage in a two year trial program whereby ASME will make changes in their existing inspection/certification program to achieve comparability with the NRC program. The ASME inspection/certification system will perform third party (the third party is neither the purchaser nor the supplier) inspections that the NRC will accept in lieu inspections by NRC. NRC will audit the ASME program to assure comparability with its program. In this manner NRC will have the potential for considerable amplification of its efforts in the mechanical area with no increase in direct NRC resources. The trial program has been underway for approximately 16 months. The NRC will evaluate the results of the trial program and make a decision regarding whether to extend or terminate the program. The NRC is currently engaging in a joint study with IEEE to study the feasibility of third party inspection in the electrical area.

*The GAO reference to 11 inspectors is to those assigned to product suppliers excluding supervision and support personnel. Additional inspectors are assigned to the inspection of nuclear steam suppliers and architect engineers.

M. GAO Recommendation Chapter 4 Number 22 (p. 30)

To improve its inspection performance and reporting practices we recommend that the Chairman, NRC

--- (22) instruct inspectors to expand their reviews to include sample examination of vendor's products.

NRC Response

As part of its effort in examining independent verification, NRC had identified the vendor program as an area for increased independent verification.

Direct visual inspections of products during routine inspection currently is a part of the vendor inspection program as a technique for assessing the effectiveness of vendor QA programs. During the early NRC vendor inspections, emphasis was placed upon identifying and achieving correction of the procedural aspects of vendor QA programs. This was a necessary first step prior to concentrating on program effectiveness. This first step has now been completed at all major vendors on the inspection lists. More time and emphasis is now being given to product observation in accordance with program policy.

We do not believe that visual inspection of primary components such as reactor vessels, valves, pumps or pipe spool pieces can reveal very much about the product quality, capability of satisfying the design requirements or the effectiveness of the QA program. Thus, our visual inspections are accomplished largely through observation of specific work activitites and special processes which have an important role in assuring the product integrity. These include operations such as welding, forming, heat treating and nondestructive testing. The main purpose of in-process observation is to verify that for the specific operations sampled, the applicable procedures are being followed, and to indicate potential areas for in-depth investigation. Inprocess observation is always supplemented by a comprehensive review of manufacturing records including items such as material certifications, welding procedures/qualifications, radiographic film, NDE records, heat treatment furnace charts, etc. This record review is necessary to complete the evaluation by determining that the procedures used are consistent with the applicable specification requirements, that NDE results are acceptable and to assess the vendors' historical performance.

Independent NRC testing of components in vendor shops presently is not done. However, a study program was initiated in early 1977 to consider independent verification options (including independent testing of components) which may be available to the entire NRC inspection program. This study program is applicable to the vendor inspection program. A second study program was recently initiated to analyze alternatives for qualification testing of environmentally sensitive safety-related equipment. Each of the alternatives represents a course of action that will provide greater NRC involvement in independent testing of components. Qualification testing may be a more practical approach to independent verification of product quality than attempting to perform piece-meal tests in vendor shops on partially completed products.