SECTION 8

QUALITY ASSURANCE

8-1. **Quality, A Joint Venture.**

a. General. Quality construction is one of the primary goals of USACE. Managing quality construction is vital to the Corps' reputation and future; it is the ability to construct projects according to professional-quality plans and specifications, on time and within budget. The plans and specifications establish the level of quality in construction projects; therefore, it is the designer that sets quality standards. Quality is defined as "conformance to properly developed requirements". The contractor controls the quality of the work and the Government, in separate but coordinated efforts, assures that the level of quality set by the plans and specifications is achieved.

b. Government quality assurance.

(1) General. The resident engineer should provide efficient QA inspections, in accordance with ER 1180-1-6, Construction Quality Management. The process starts well before construction. Examples of activities performed prior to the start of construction are: QA planning, establishing CQC requirements, participating in design review conferences, performing BCO reviews and plan-in-hand reviews.

(2) Quality assurance plan. ER 1180-1-6 requires that the area/resident engineer develop a written QA organizational plan that addresses the overall QA operations of the field office. After initial development, the plan will be reviewed and updated as often as necessary, but not less than annually. Supplements incorporating project specific requirements should be developed for those contracts with unique requirements not covered in the basic plan.

The QA plan includes:

(a) The resident engineer's QA organization.

(b) Procedures for reviewing contractor submittals, quality control reports, and test results.

(c) Procedures for surveillance of CQC activities.

(d) Procedures for reviewing CQC reports.

(e) Procedures for reporting construction deficiencies and following up to assure correction.

(f) Procedures to assure that the contractor submits all items required by the contract, particularly repetitive items.

(g) Procedures for sampling, testing, and QA inspection by Government personnel.

A suggested outline for the QA plan is found in ER 1180-1-6.

(3) In accordance with ER 1180-1-6, the resident engineer conducts a CQC/QA coordination meeting for detailed planning of activities of Government and contractor quality construction elements. Minutes of this meeting are prepared. On small contracts this meeting may be a part of the preconstruction conference (see paragraph 6-5). Careless inspection brings about unsettled conditions and disputes; arbitrary and dictatorial inspection creates friction. QA efforts at the inception of each phase of work are particularly effective, since corrective action are easier to implement at this stage.

(4) Quality assurance preparation. The main duty of QAP, through monitoring of CQC operations, is to assure that the work is being performed in accordance with the plans and specifications and that the CQC system is functioning effectively. To accomplish this, QAP perform the following:

(a) Study the plans and specifications in advance.

(b) Anticipate problems and requirements.

(c) Perform necessary investigations on a phase of work well in advance of work commencement.

(d) Obtain the COR's approval of shop drawings before materials are brought on the job.

QAP should be informed that assistance and advice will be provided to them, whenever it is needed. Immediately available to them is a copy of the plans and specifications, including all necessary reference material, amendments, revisions, and modifications; approved shop drawings for material on the job; applicable volumes of the Construction Inspector's Guide; a copy of EM 385-1-1, Safety and Health Requirements Manual; a copy of the contractor's accident prevention plan; a copy of

the CQC plan; the Activity Hazard Analysis Program; daily log reports or books; and camera, rules, tapes, and other measuring devices of testing equipment as required to check the various items of work for which the QAP are responsible. The resident engineer prepares a QA plan for the office. After initial development, the plan will be reviewed and updated as often as necessary, but not less than annually. Supplements incorporating project-specific requirements will be developed for those contracts with unique requirements not covered in the basic plan. The plan states, in detail, how the CQC activities will be monitored, responsibilities and authority to QAP, types of inspections to be performed by QAP, methods to be used for inspections performed by the Government, and specific steps to assure compliance of the work with the plans and specifications.

(5) Three-phase control concept. The resident engineer ensures that CQC inspections are performed at the outset of each new phase on segment of construction. Preparatory inspections prior to physical work placement ascertain that materials comply with specification and/or approved submittal documents. Initial inspections occurring at the outset of work placement establish and achieve workmanship standards at the beginning of each construction phase. Government participation in preparatory and initial inspections is highly desirable. Follow-up inspections on a daily or routine basis are more productive when preceded by joint contractor/USACE preparatory and initial inspections. Preparatory and initial inspections are performed with checklist to ensure thoroughness. All phases of inspections are documented. It should be kept in mind that the contractor is responsible for conducting these inspections, while the Government is responsible only for assuring they are conducted, are adequate for the purpose, and are properly documented.

(6) Deficiencies in contract performance. The resident engineer is on the alert for deficiencies and their prompt correction. Upon detection of a deficiency, the contractor is first informed verbally and, where necessary, the verbal notification is immediately confirmed in writing. Additionally, the USACE representative makes a descriptive entry on the daily QA report and the resident engineer insists that a like entry be made by the contractor on the daily CQC report. The district is promptly informed of any refusals by the contractor to correct a deficiency. A complete record is kept of facts relating to the deficiencies in contract performance and efforts to correct them.

(a) Potential problems in quality control. The CQC/QA system works by making the contractor responsible for construction mistakes. This requires the Government to take a firm approach to enforcement and to notify the contractor immediately upon detecting any unacceptable materials, equipment, or workmanship. The resident engineer may require the contractor to make changes to the CQC plan at any time during construction or have unqualified or ineffective personnel remove when necessary to obtain the quality construction required by the contract. Problems encountered during construction vary according to the specific project; most, however, fit into one or more of the following categories:

- Delays. There may be delays in submittals, in the correction of deficiencies, or because or lack of acceptance of the CQC plan.

- Planning and control. Many problems can be caused by a lack of planning and control and a failure to take corrective action in the planning and control process. The resident engineer provides sufficient and timely QA as part of planning and control.

- Testing. Improper, inadequate, or untimely testing causes problems.

- Documentation. Problems occur because of late, incomplete, or incorrect documentation. Maintaining written records of QA actions and test results is as important as taking the actions. The CQC reporting system may cause appropriate action to be taken, or it may be the basis of settling expensive claims when those who were directly involved are no longer available. If documentation is inadequate, communications break down and the legal position of the Government may be jeopardized.

(b) Contract enforcement measures. The following measures are available to the resident engineer through the contracting officer for enforcing the contract. Further explanation of these actions can be found in Section 7.

- Require removal and replacement of deficient material and/or workmanship. The "inspection of construction" clause of the contract gives the contracting officer the right to require the conctractor to remove or tear out any completed construction amd to examine it for compliance with contract requirements. The clause further provides for the contractor to pay all costs for removing and replacing work found to be defective or nonconforming

with contract requirements. If however, the work is found to conform to contract requirements, the Government will pay all removing and replacing expenses. These expenses are covered by a modification issued pursuant to this contract clause.

- Withhold payment for unsatisfactory work in place.

- Require removal of unqualified or ineffective personnel (See paragraph (a) above, Potential Problems in Quality Control).

- Require the contractor to assume personal supervision (See contract clause entitled Superintendence by the Contractor).

- Stop work. A work stoppage differs from a suspension of work in that it is an extreme action that is necessitated by acts of the contractor involving major safety violations (potential loss of life or damage to property is imminent) or non-conforming construction which if allowed to continue would result in extensive tearout and delay. It is important that the resident engineer stop only that portion of the work that is affected by the actions or lack of actions by the contractor and that all of the facts of the stop-work action be documented in writing. In addition, the contractor is informed in writing of the extent of the work stoppage, the date and hour work was stopped, the reason for the action, and the conditions under which the contractor may proceed again. Accurate records must be maintained on workers, material, and during the stoppage as well as time worked. The records must specifically reflect the effect the stop order has on contract costs or time, which might reasonably be used as a basis for a claim for extra compensation by the contractor. Do not lead the contractor to believe that any adjustment is established. When the stoppage is lifted, the contractor is informed in writing.

- Issue an unsatisfactory appraisal (See paragraph 7-9, under Construction Contractor Performance Evaluation).

-Terminate the contract (See contract clause entitled Default (Fixed-Price Construction).

(7) Shop inspection.

(a) The resident engineer determines the necessity for shop inspection of equipment and materials being furnished and installed by the contractor and for initiating requests to the district for shop inspection when it is beyond the capability of the resident engineer staff. This determination should be made during the early stages of the contract. Before requesting shop inspection, the resident engineer determines the date the material or equipment is to be manufactured, the date it is needed on the job, and the manufacturer's or supplier's address. A copy of the contractor's purchase order is included with the request for shop inspection.

(b) The following items are considered in determining the necessity for shop inspection: Type of materials or equipment involved, cost of inspection, importance of checking the materials, and particular requirements in the specifications, among others.

(c) A majority of the shop inspections for military contracts is performed by Defense Contract Acquisition Services (DCAS) through the use of interagency agreements. Shop inspections on civil works contracts are normally accomplished by other USACE district personnel. The resident engineer makes sure that the material is being properly inspected and tested, that it meets the contract requirements upon delivery to the job, and that the delivery time will not delay the construction.

(d) Copies of the inspector's acceptance reports should be furnished to the resident office, together with shipping lists, as they are received from the inspecting office. Mill test reports and certificates of compliance provided by the contractor to the resident engineer are checked against the applicable contract specification requirements to ascertain that the materials meet the requirements of the specifications.

(8) Inspection for occupancy, prior to completion.

(a) Beneficial occupancy inspection. A beneficial occupancy inspection is performed when the contract specifically provides for joint occupancy of the facility by the contractor and the user, and the areas to be occupied are complete to the extent needed for beneficial use. This provision is typically included in the Special Provisions paragraphs, Completion of Work. CQC confirms completion by performing the inspection to demonstrate the building is reasonably functional for occupancy. Until the resident engineer concurs with the contractor's progress, the beneficial occupancy inspection should not be arranged.

Upon concurrence, the resident engineer notifies the district and then coordinates the attendees. This inspection is made jointly by the resident engineer, a representative of the using service, and the contractor. It is important that all the deficiencies in the inspection be carefully recorded and that the using service agrees to accept the item being inspected with the construction deficiencies noted. The contractor is required to correct the noted deficiencies as soon as possible.

(b) Use and possession prior to completion. FAR 52.236-11 (Use and Possession Prior to Completion) provides the Government with the right to take possession of completed or partially completed contract work where no phased beneficial occupancy is contractually provided. This possession is implemented when the Government needs an interim access to utilize permanent portions of buildings and/or equipment, especially when Government-furnished equipment (GFE) is involved in a contract. In this situation, the Government may need access to certain areas of work in order that their GFE vendors can perform acceptance tests or maintenance on their items. Prior to such possession, the contractor should be notified in writing of the Government's intentions to take interim possession of that portion of the work. Documentation on the status of the work prior to and subsequent to the Government's possession is provided to the using service and the contractor. If loss or damage is apparent, the "Use and Possession Prior to Completion" clause provides for an equitable adjustment in contract price and/or time. Additionally, if possession by the Government causes a delay to the overall contract, the contract is modified at the earliest practicable date. The initial letter to the contractor requests a proposal for this contract change and advises of apparent delays that will cause an impact on completion.

(9) Prefinal and final inspections.

(a) A prefinal inspection is appropriate after the CQC representative has performed an overall preliminary inspection and demonstrates correction of all deficiencies noted at the preliminary inspection. Based on the contractor's past performance, the resident engineer projects the approximate completion date of construction work. When this date is determined, the district is provided a schedule for the prefinal inspection so that interested agencies may be invited to attend. Most Using agencies require at least 10 days advance notice before the prefinal inspection.

Prefinal inspections are not made until the work is substantially complete. Should the contractor's progress fall behind schedule, the district is informed and furnished details of the work that will not be completed before the inspection date. This information may allow the district to delay the inspection. If care is exercised in scheduling the prefinal inspection, delays of this nature should rarely occur.

(b) If CQC has functioned in accordance with the contract, no deficiencies or only a few minor ones would be expected at the prefinal inspection. In this case, the prefinal inspection may be considered the final inspection. If another inspection is necessary, the final inspection date is established at the conclusion of the prefinal inspection. This date is determined by the resident engineer based on the quantity of work remaining. The deficiencies noted during the inspection are precisely stated and furnished to the contractor promptly. The date of the final inspection is provided to the interested agencies for the benefit of their planning and final acceptance of the project. The resident engineer determines final acceptable following a final inspection which yields no further deficiencies. If the using services does not normally attend the prefinal inspection, the resident engineer should evaluate the construction prior to the inspection and assure that the using service is present if it is likely to become a final inspection.

(10) Warranty inspections. Warranty inspections are held at 4 and 9-month intervals after transfer. Joint USACE/ using service inspections are held wherein defects are identified and corrective action taken on warranty items in accordance with ER 415-345-38, Transfer and Warranties.

c. Contractor quality control.

(1) CQC is the system by which the contractor bears responsibility for all activities necessary to manage, control, and document work to comply with contract plans and specifications. Prior to the start of work, the contractor prepares a CQC plan indicating staff organization, control of materials, installation techniques, and conformance testing. The original submission of this plan applies to all contract work and is effective for the life of the project. Further information on the interrelationship between the QCC and quality management is contained in the EFARS.

(2) On receipt of the CQC plan, the resident engineer reviews the plan to verify conformance with the CQC contract provision. All increments of the CQC function must be addressed with the intention of presenting a complete plan, and the resident engineer's review compares and evaluates each of its features against the specified requirements. The following are key points typically checked as part of this review:

(a) The name, qualifications, and delegated authority of an officer of the corporation.

(b) Procedures for managing material submittals, including those of subcontractors.

(c) Control testing procedures for each specific test required in the contract, including laboratory facilities.

(d) Reporting procedures centering on the three-phase inspection of construction, including proposed reporting formats.

(3) The COR provides a prompt written response to the contractor accepting the CQC plan as submitted or with specified changes subject to satisfactory performance. A contractor's concurrence with exceptions may be required before start of work. After acceptance of the CQC plan, the contractor notifies the COR in writing of any proposed change. Proposed changes are subject to acceptance by the COR.

8-2. **HTW & Chemical Quality Management.**

a. The nature and uniqueness of handling toxic and hazardous wastes, and other chemicals calls for special procedures to be utilized when dealing with these substances. ER 1110-1-263, Chemical Quality Management -- Toxic and Hazardous Wastes, describes the quality management responsibilities and procedures assuring the validity of thoroughly documented and legally defensible chemical data gathered during construction and related activities involving HTW. This guide is applicable to remedial action projects involving toxic or hazardous wastes under either the EPA Superfund Program or the Defense Environmental Restoration Account projects and describes preventative or corrective measures mitigating potentially hazardous situations affecting human or environmental receptors and associated data collection activities. Additional information can be obtained from EP 1110-2-6, Superfund Management Guide regarding management responsibilities under this program.

8-3. **DCAF Bulletins.**

a. The Design Construction Analysis Feedback Bulletin (DCAF) is a publication which informs the FOA's about current design and construction problems and their possible solutions. This publication has been initiated as an outgrowth of the Design/Construction Evaluations which are required by ER 415-1-13. These evaluations have been conducted for many years and a large body of knowledge has been gathered. In the past the feedback from these evaluations has not proven to be entirely satisfactory. Repetitive observations, lessons learned, good ideas, changes in guide specifications and/or code publications, etc. which are gathered during design/construction evaluations and from other outside sources are subjects covered by this publication on an as needed basis.

b. FOA's are encouraged to submit observations, lessons learned, good ideas, et., for consideration for publication in a future DCAF Bulletin. Submitalls should be sent to CEMP-CE at HQUSACE.

8-4. **Code Forums.**

Code Forums are published by the Construction Evaluation Branch (CEMP-CE) at HQUSACE to communicate information to the FOA's concerning various codes. They provide and highlight revisions, interpretations, and clarifications of various construction industry code requirements. They are published in response to either situations observed during design/construction evaluations of from recent guidance, revisions, and/or additions regarding code requirements. Code Forums are published on an as needed basis and are considered to be informational in nature.

8-5. **A/E Responsibility Management Program. (AERMP)**

a. The primary goal of the Architect-Engineer Responsibility Management Program (AERMP) is to improve the quality of services furnished to the U.S. Army Corps of Engineers by its contracts A-E's. An additional objective of the AERMP is to recover damages to the Government that result from an A-E's negligence or breach of contractual duty. ER 715-1-10, (AERMP) is the regulation which defines the responsibilities and establishes general procedures for investigating and taking action on performance deficiencies of A-E firms/individuals having contracts with USACE.

b. A-E firms under contract with the USACE are responsible for providing professional quality work, i.e., work that meets the standard of care, skill, and diligence that one in the profession would ordinarily exercise under similar circumstances. If an A-E fails to meet such a standard, or any other contractual duty, the contracting officer shall review the circumstances involved, including the resulting damages to the Government and take appropriate action in accordance with FAR 36.608.

c. It is important that the resident engineer is completely familiar with ER 715-1-10, since in most cases the requirement for a change originates from the field and any future action for recover damages will most likely be based on the reasons for the changespresented by the resident engineer. The ER describes the activities and actions to be taken from the point of discovery of a performance deficiency to the point of issuance of a claim by the Government against the A-E. An ancillary benefit of the routine evaluation of design deficiencies through the AERMP program is the valuable feedback data and lessons learned that can be used to improve future designs.