SCGEM Engineering and Construction Services

Construction Quality Assurance Program

&

Quality Control Procedures

SOUTHERN COMPANY

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Southern Company Generation
Engineering and Construction Services
Construction Services
Construction QA Program and Quality Control Procedures

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SCG Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – A – 01)

Quality Assurance Program Overview

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	2/9/00
0	Issued for Construction	*RHR, JR.*	*DMC*	*RWM*	2/21/00
1	Revision to Attachment A	*RHR, JR.*	*DMC*	*RWM*	3/6/00
2	General Revision including Department Name and Format Changes	*RHR, JR.*	*DMC*	*JBF*	1/31/02
3	Editorial changes to include department name change	*RHR, JR.*	*DMC*	*JCH*	9/26/02
4	General revision to document adherence to the E&CS Basic Quality Policy, SCG Chapter XII – Contract Guidance Manual and the E&CS Policy and Procedure Manual.	*RHR, Jr.*	*JBF*	*C.A. Baker*	02/14/05

QC – A – 01
Quality Assurance Program Overview

Purpose

The purpose of this procedure is to outline the construction quality assurance program of SCG Engineering and Construction Services **(E&CS) Construction Services.** This procedure will give an overview of the program, describing overall responsibilities, areas to be covered by the program and a general list of criteria that will be used to determine when this QA program will be invoked.

Scope

This procedure sets forth the construction quality program requirements that are to be applied to work performed by SCG **E&CS** Construction Services**.** It is intended that this QA program will meet the requirements of the SCG Engineering **& Construction Services** Basic Quality Policy (BQP) as it relates to Construction Services. **It is also intended that this Program, where applicable, will meet the criteria outlined in the SCG Chapter XII Contract Guidance Manual.**

This Construction QA Program and Quality Control Procedures Manual is Volume 5 of the E&CS Policy and Procedure Manual. The 5 volumes in the E&CS Policy and Procedure Manual are as follows:

- **Volume 1: Corporate Policies and Procedures**
- **Volume 2: Site Administration Policies and Procedures**
- **Volume 3: Construction and Contract Administration Policies and Procedures**
- **Volume 4: Environmental, Health and Safety Policies and Procedures**
- **Volume 5: Construction QA Program and Quality Control Procedures**

ISO 9001 has been used as a reference and guideline, but this program is not designed to meet the requirements of ISO 9001. A list of procedures included in this QA program is shown as Attachment A to this procedure.

Responsibility

The decision to implement this QA program for a particular construction job will be made at the sole discretion of the management of SCG **E&CS** Construction Services. The decision to implement this program (or any part of this program) for a particular job will be based on, but will not be limited to, the following criteria:

- Size and cost of the project
- Effect of the project on the overall goals of the Southern Company
- Critical nature of the job (quality/safety)

The implementation of this QA program will be initiated by a "letter to file" from the appropriate management of SCG **E&CS** Construction Services. This letter will outline the areas of the program appropriate for the particular job. **Refer to Attachment D for a sample letter.**

The decision to "Stop Work" resides with the management of SCG Engineering and Construction Services and is no way affected by the decision to implement or not implement this QA Program.

Construction Site Organizational Structure

Each construction site shall have at least one E&CS Construction Services QC representative or individual identified as the QA/QC contact. Depending on the construction site, this QA/QC function may be expanded to include additional personnel as dictated by the size of the project and/or scope of work activities. The organizational structure for the project shall be aligned in such a manner as to allow the on site QC representative the necessary autonomy to perform the QA/QC function in an unbiased manner.

In addition, the onsite E&CS Construction Services QC representative will work with the Corporate QC Coordinator to conduct periodic assessments of the overall QA/QC implementation for the project.

Program Implementation

Implementation of the Construction Services QA/QC Program on a particular job site will generally following the six steps listed on Attachment B and outlined below.

- **Step 1: Review the Construction QA/QC Implementation Checklist (Attachment C) – This checklist should be used as a discussion guide by Construction Site Management, the Corporate QC Coordinator and the Project Manager to insure that all aspects of the Program are being considered.**

- **Step 2: Generate "Plan to Implement" Letter (Attachment D) and send to Construction Services Logistics Manager – This letter should be used to document the intent to implement the Program and any anticipated deviations from full implementation. Copies of the letter should be sent to the Regional**

Construction Manager, the Project Manager, the Corporate QC Coordinator and onsite Document Control.

- **Step 3: Discuss specific project implementation plans –Construction Site Management with assistance from the Corporate QC Coordinator should discuss specific implementation plans for the particular construction project.**

- **Step 4: Develop and implement specific components of the Program – Construction Site Management should develop site specific plans based on discussions in step 3 above and assign responsibilities for implementation.**

- **Step 5: Conduct overview meetings with all Construction Services site employees – At some point in the six step process, the Corporate QC Coordinator will generally conduct an overview meeting on the generic QA/QC Program. If the majority of the onsite Construction Services personnel are not familiar with the QA/QC Program, this overview could occur earlier in the six step process. However, holding the overview meeting at this stage allows Construction Site Management to interject specific requirements and responsibilities for the particular construction site. Attendance in this overview meeting will be documented in the individual's training records in SHIPS.**

- **Step 6: Conduct periodic reviews with appropriate feedback and followup to Construction Site Management. – The Corporate QC Coordinator with assistance from the on site QC representative will conduct periodic assessments of the onsite Program implementation. Tools for these assessments will be the implementation checklist (attachment C) and process observations based on specific components of the QA/QC Program. Results of the assessments will be shared with site Construction Management and will be used as the basis for future assessments.**

Quality Assessments

Various reviews and assessments will be carried out to verify that Construction Services projects are following the requirements of the Construction Services QA/QC Program. These reviews and/or assessments will consist of, but not be limited to, the following:

- **Assessments conducted by the E&CS Manager QA in accordance with the E&CS Basic Quality Policy**

- **Assessments associated with Sarbanes Oxley required controls**

- **Assessments associated with administrative procedure 3H – Site Assessment and Peer Review**

- **Periodic assessments performed by the Construction Services QC Coordinator as outlined in Step 6 of the Implementation Process above.**

- **On site assessments conducted by Construction Site Management**

- **Approvals and Revisions**

Procedures issued for review and comment will be identified with an "alpha" revision designation. Procedures approved for use will be issued with a numerical revision designation, beginning with "0". All procedures approved for use will be dated and contain the initials and/or signature of the following:

- Person who prepared **or revised** the procedure
- **Construction Logistics Manager or designee**
- **Vice President** Construction Services **or designee**

A brief description of the reason for a revision will be given on the cover sheet along with appropriate approvals. Material within a procedure that has been revised or added will be indicated with **"bold"** type and a "bar" **(|)**.

Distribution of the Manual

As outlined in administrative procedure 1A – Policy and Procedure Manual Overview, there will not be a controlled distribution of this Manual. The web copy of the Manual will always be up-to-date and will contain the latest revision of all procedures. The web version of this Manual can be accessed from the Construction Services home page. Refer to Attachment E for the steps in accessing the Construction Services home page and the QA Manual.

Notification of newly approved or revised procedures will be via an email distribution list. It will be the responsibility of the Users of this Manual to access and/or print the approved or revised procedures from the web.

Document Control

For document control and record keeping purposes, the original signed procedures shall be maintained in a notebook by the Construction Logistics Manager or designee. This designee will generally be the Corporate QC Coordinator.

As procedures are revised, the voided procedures shall be marked "VOID" on the cover page, removed from the "Current" notebook and placed in a second

"Voided" notebook. By definition, the "Current" notebook shall contain only the original signed copies of the current revision of all procedures. The "Voided" notebook shall contain all revisions of the voided original procedures.

SCG Engineering and Construction Services

Construction QA Program and Quality Control Procedures

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Attachment A

The Six Steps to E&CS Construction Services QA/QC Program Implementation

1) Review the Construction QA/QC Implementation Checklist.

2) Generate "Plan to Implement" Letter and send to Construction Services Logistics Manager.

3) Discuss specific project implementation plans.

4) Develop and implement specific components of the Program.

5) Conduct overview meetings with all Construction Services site employees.

6) Conduct periodic reviews with appropriate feedback and follow-up.

Attachment B

SCG ENGINEERING AND CONSTRUCTION SERVICES
CONSTRUCTION QA/QC PROGRAM IMPLEMENTATION CHECKLIST

Project: _____ **Date of Review:** _____

Activity	Yes	No	N/A
1) Is the Construction Management team familiar with the contents of the E&CS Basic Quality Policy (BQP), the Construction QA Program and Quality Control Procedures and the location of these documents on the intranet?			
2) Have there been discussions to determine the applicable portions of the Construction QA Program for this particular project?			
3) Has a letter been written to the Construction Services Logistics Manager outlining the portions of the Construction QA Program to be used on this project?			
Reference: QC-A-01 QA Program Overview **Comments/Action Items:**			
4) Has there been a review of the contractor's QA/QC Program to insure that the Program will meet the scope and requirements of the construction project.? Is the contractor prepared to implement the QA/QC Program as outlined in the QA/QC Manual?			
Reference: QC-A-02 **Comments/Actions Items:**			
5) Is there a document control process in place for this project?			
Reference: QC-B-01 **Comments/Action Items:**			

Attachment C
Page 1 of 4

Activity	Yes	No	N/A
6) Is there a process in place for documenting design changes, field changes and clarifications and nonconformances?			
Reference: QC-B-01; QC-B-02; QC-H-01 **Comments/Action Items:**			
7) Is there a process in place to evaluate potential contractors and to evaluate contractors currently performing work on this project?			
Reference: QC-C-01 **Comments/Action Items:**			
8) Is there a process in place to properly perform receipt, storage and handling of construction products?			
Reference: QC-D-01 **Comments/Action Items:**			
9) Is there a process in place to evaluate and discuss significant events to insure critical milestones, inspection hold points and acceptance criteria are met?			
Reference: QC-F-01 **Comments/Action Items:**			

Attachment C
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Activity	Yes	No	N/A
10) Is there an inspection and testing program in place that allows the unbiased reporting of inspection and test results to SCG Construction Management?			
11) Are the inspectors and technicians qualified and/or certified as required by standards and specifications?			
12) Has sufficient survey control been established to insure initial and ongoing verification of proper locations, plumbness, etc.?			
Reference: QC-G-01, QC-G-02; QC-G-03; QC-G-04; QC-I-03 **Comments/Action Items:**			
13) Has a Hold Tag or equivalent process been implemented to isolate nonconforming items or items with incomplete inspections from construction use?			
Reference: QC-H-02 **Comments/Action Items:**			
14) Is a process in place that will help minimize the reoccurrence of actual or potential nonconformances and allow for the utilization of lessons learned?			
Reference: QC-H-03 **Comments/Action Items:**			

Attachment C
Page 3 of 4

Activity	Yes	No	N/A
15) Is there a process in place to allow for the control of quality records including controlled access during construction and proper storage at the completion of the project?			
Reference: QC-I-01 **Comments/Action Items:**			
16) Is there a process in place that ensures employees have the technical capabilities and skills sets necessary to perform the required quality tasks and to manage a quality project?			
Reference: QC-I-02 **Comments/Action Items:**			
17) Is there a process in place to ensure that specific requirements of products and materials that are critical to the quality of construction are conveyed, documented, reviewed and approved throughout the purchasing process?			
Reference: QC-C-02; QC-E-01 **Comments/Comments/Action Items:**			
Meeting Attendees:			
Final Comments:			

Implementation Review Conducted By:

_____

Attachment C
Page 4 of 4

Energy to Serve Your World℠

Date

Joby Frame
SCG E&CS Construction Services
Construction Logistics Manager

RE: Plant ----------
(Type of Project)
SCG Engineering and Construction Services
Construction QA Program and QC Procedures

Joby:

In accordance with the guidelines stated in the Quality Assurance Program Overview procedure (QC– A–01), we will implement the SCG E&CS Construction Services Construction QA Program and QC Procedures Manual for the Plant ---------- Project. We will meet the intent of the overall QA Program and will invoke appropriate procedures as relevant to the scope of work for this project.

Sincerely,

(Name)
Construction Site Manager

cc: Project Manager
Regional Construction Manager
Corporate QC Coordinator
On site Document Control

Attachment D

You can access the Construction Services Policy and Procedure Manual
Volume 5 – Construction QA Manual and QC Procedures
via the following steps:

Start at the “Southern Today” homepage
Click on “Business Units and Departments” at the top of the page
Click on “Southern Company Generation”
Click on “Departments” on the left
Click on “Engineering and Construction Services” on the right
Click on “Construction Services” on the left
Click on “”Construction Services Policy and Procedure Manual” on the left
Click on Volume 5 at the bottom of the page

Attachment E

SCGEM Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – A – 02)

Oversight and Control of Contractor QC Programs

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	R. Reynolds	N/A	N/A	8/18/04
0	Issued for Construction	*R. Reynolds*	*J. Frame*	*A. Baker*	10/11/04

QC – A - 02
Oversight and Control of Contractor QC Programs

Purpose

The purpose of this procedure is to outline the guidelines for providing oversight and control of a contractor's quality control program on SCGEM E&CS Construction Services construction projects.

Scope

This procedure is to be used by SCGEM E&CS Construction Services to manage and evaluate a contractor's quality control program. The Construction Services QA/QC Program will be used as a benchmark to gauge the completeness of the contractor's program. The contractor's program, as a minimum, should contain components that mirror the Construction Services QA Program.

This procedure is an integral part of the SCGEM E&CS Construction Services construction Quality Assurance Program and is intended for use on SCGEM Engineering and Construction Services construction projects.

Responsibility

It will be the responsibility of SCGEM Engineering and Construction Services personnel and/or their designee to implement and control the use of this procedure. It will be the responsibility of the contractors performing work on E&CS construction sites to implement their quality control program as outlined in their quality control manual.

Construction Projects with Prime Contractors

As part of the initial bid package, potential contractors are instructed to prepare their bids to include an on site QC program that contains, as a minimum, components that mirror the Construction Services QA Program.

Upon award of a contract, the contractor will be expected to implement their QC program as outlined in their QC manual. Generally, it is expected that QC inspection in the field will be performed by the Contractor supplemented, as needed, with 3rd party testing personnel hired by the Contractor.

On site E&CS Construction Services personnel will perform periodic QA surveillance of the Contractor's program and the Contractor's completed work. This QA surveillance should include all aspects of the Contractor's program as outlined in the Contractor's

QC Manual. As a general rule, Construction Services personnel should perform QA surveillance/inspection on a minimum of 10% of the work accepted as complete by the Contractor's QC group. The percentage and frequency of these inspections should be increased, as necessary, based on such factors as:

- scope and criticality of the work
- contractor's previous performance
- site specific and/or industry standards or requirements

If the results of the QA surveillance indicate issues with the contractor's performance, the contractor shall be immediately notified and steps shall be taken to identify and correct the cause of the problems. There shall be an increase in QA surveillance by Construction Services until such time as the results of the surveillance indicate a sustainable improvement in the contractor's performance.

Whenever possible, the number of inspections required should be calculated based on a defined number of possible inspections, for example:

- number of bolted connections
- number of welds
- number of terminations
- number of structural members received and accepted
- number of hanger supports

In addition the Corporate QC Coordinator will work with the onsite E&CS Construction Services QC representative to conduct periodic assessments of the overall QA/QC implementation for the project.

Qualifications of QC Personnel

It will be the responsibility of the contractor to employ qualified inspection personnel in sufficient numbers to properly staff the job. The qualifications of these individuals shall be submitted to Construction Services for review. In addition, as the need arises, the contractor will be responsible for hiring a qualified 3rd party testing agency to supplement QC staffing requirements. The qualifications of this agency along with the qualifications of inspectors/technicians assigned to the construction project shall be submitted to Construction Services for review.

Contractor's QC Organization

The contractor's on site organization shall be structured in such a manner as to allow the QC personnel the necessary autonomy to perform inspections and tests in an unbiased manner.

Inspection and Testing Plan

The contractor shall submit to Construction Services an inspection and testing plan related to the scope of work being performed. This plan shall include, as a minimum, such items as:

- type and frequency of testing or inspections
- proposed routing of completed and/or in process inspection documentation to verify contractor QC acceptance
- timely routing and distribution of 3rd party inspection and test reports
- hold points for in process operations to allow time for Construction Services inspection, review or periodic QA surveillance
- timely submittal of completed inspections to allow time for Construction Services inspection, review or periodic QA surveillance
- copies of proposed forms, checklists and reports*
- types and methods of transmittals
- responsible parties

*Construction Services forms, checklists and reports may be used in lieu of contractor's documents if mutually agreeable

Labor Broker Construction Projects

In a labor broker arrangement, the E&CS Construction Services QA Program and QC Procedures will be the governing documents for all non ASME work performed on the project. All ASME code work performed on the project shall be in accordance with the labor broker's ASME Quality Control Manual. The labor broker's ASME Quality Control Manual shall meet the requirements of the ASME Boiler and Pressure Vessel Code, Sections I, B31.1, and VIII, Division 1, the National Board Inspection Code and Jurisdictional requirements and shall be the governing document in all Code related work on the project.

A site specific overview procedure should be written that:

- encompasses the relevant portions of the labor broker's QA/QC program via addendums
- links the site specific QA Program to the overall Corporate E&CS Construction Services QA Program
- defines the scope and parameters of the site specific QA Program as noted above
- defines site specific roles and responsibilities
- outlines the review, approval and controlled distribution process for the site specific QA Manual

Generally speaking, this site specific procedure should be modeled after quality control procedure QC-A-01. To maintain continuity with the Corporate QA Program, this site specific overview procedure should be entitled: QC-A-00: Site Specific QA/QC Program Overview.

Distribution and control of this site specific QA Program Manual shall be controlled by on site Construction Services Management by the method most appropriate for the project (i.e. web site, S drive, hard copy).

In order to instill Quality as part of the job, it is anticipated that initial QC inspection will be performed by the crafts performing the work. Verification of QC inspection and QA oversight will be performed by E&CS Construction Services management personnel.

Each construction site shall have at least one E&CS Construction Services QC representative. Depending on the construction site, this QA/QC function may be expanded to include additional personnel as dictated by the division of work activities among the craft and Construction Services personnel. The organizational structure for the project shall be aligned in such a manner as to allow the on site QC representative the necessary autonomy to perform the QA/QC function in an unbiased manner.

In addition, the Corporate QC Coordinator will work with the onsite E&CS Construction Services QC representative to conduct periodic assessments of the overall QA/QC implementation for the project.

Document Control

All contractor and 3rd party completed inspection and testing reports shall be submitted to Construction Services in a timely and controlled manner. These documents shall be assembled into appropriate turnover packages as outlined in administrative procedure 3G – Processing Startup Packages. At the completion of the construction project, this documentation shall be processed in accordance with procedure QC – I – 01: Control of Quality Records.

Southern Company Generation

Engineering and Construction Services

Construction Services

Construction Services Quality Procedures

Procedure QC–B–01

Construction Services Document Control

	Rev. 6	**Rev. 5**
Date	9/4/07	8/16/06
Revised By	R.H. Reynolds, Jr.	R.H. Reynolds Jr
Reviewed By		
Construction	T.L. Magnus	T.L. Magnus
Approved By		
Construction	K.D. Russell	D.L. McKinney

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure documents the proper distribution of controlled documents issued to and distributed on Engineering and Construction Services (E&CS) construction sites.

This procedure is an integral part of the E&CS Construction Services construction Quality Assurance program. This procedure documents the processes in place on construction projects using hard-copy transmittals and copies of drawings distributed by E&CS Document Services. This procedure also documents the electronic transmittal notification process, the printing of drawings directly from Documentum, and the use of PIMS for document control.

1.2 Scope

This procedure affects all E&CS Construction Services personnel and contractors who work for them. For this procedure, controlled documents shall include, but are not limited to, the following:

- Engineering and Construction Services drawings and other controlled documents issued by E&CS Document Services via Documentum.
- Documents received from the contractors performing work on E&CS construction sites.
- Documents distributed by Construction Services onsite personnel to the contractors performing work on E&CS construction sites.
- Design Change Notices (DCN), Construction Miscellaneous Transmittal Forms (CMTF), and other documents utilizing the Project Information Management System (PIMS).
- Advance prints the Design organization transmits to or makes available to Construction Services.

2.0 DEFINTIONS AND REFERENCES

2.1 Definitions

advance print – A drawing transmitted by Design instead of Document Control. Examples include an in-process drawing or an official drawing being transmitted early.

Construction Miscellaneous Transmittal Form (CMTF) – A PIMS-generated form used by Construction Services and contractors to transmit contract deliverables and other miscellaneous documents.

Design Change Notice (DCN) – A PIMS-generated form Design uses to transmit advance engineering design information to Construction Services prior to a formal drawing revision.

Documentum – A document management system supported by E&CS Document Services. Documentum is the repository for official quality records.

Project Information Management System (PIMS) – A Web-based document and data management system used by E&CS to manage documentation generated during the life cycle of a construction project to include engineering design, procurement, and construction.

Transmittal Tracking Database – A Microsoft® Access database used for the generation and tracking of site document transmittals.

2.2 References

E&CS Basic Quality Program
Design Procedure D2-03, Domestic Drawing Process
Design Procedure D2-09, Vendor Document Processing
Design Procedure D3-02, Preparation and Distribution of Design Change Notices
Construction Services Procedure QC-H-01, Nonconformance Report
Construction Services Procedure QC-I-01, Control of Quality Records
Procedure DS 3-1, Document Transmittal
PIMS Guideline 3-A, Design Change Notice
PIMS Guideline 2-H, Construction Miscellaneous Transmittal Form (under development)
Transmittal Tracking Access Database Instruction Manual

3.0 RESPONSIBILITY

3.1 Construction Services

Construction Services shall maintain this Construction Services procedure. Prior to the transmittal of any documents, Construction Services shall notify Document Services of the following:

- The number of documents needed.
- The contact employees at the job site.
- In the case of drawings, the number of each size needed.

3.2 Recipients of Controlled Documents

Recipients of controlled documents shall be responsible for:

- Updating controlled documents when issued.
- Destroying or marking voided documents when new drawing revisions are issued.

3.3 Construction Services Construction Site Manager

The Construction Services construction site manager or designee shall be responsible for implementing and ensuring adherence to the scope and requirements of this procedure.

3.4 Construction Services Site Quality Lead

The Construction Services site quality lead or designee shall be responsible for ensuring quality preplanning, monitoring, and administration of this procedure.

3.5 Document Services

- Notifies the onsite Construction Services Document Control contact person of document availability via E-mail.
- Generates transmitted letters for hard-copy transmittals and forwards them to onsite Construction Services Document Control contact person.

3.6 Construction Services Document Control

- Receives E-mail from Document Services of document availability.
- Reviews transmitted hardcopy for accuracy and completeness.

- Notifies Document Services of any discrepancies between the hard-copy transmittal and the actual documents.

3.7 Regional Corporate Quality Coordinator

- Periodically reviews the document control process at construction sites to evaluate implementation and adherence to this procedure.
- Responds to inquiries regarding the content and implementation of this procedure.

4.0 PROCEDURE

4.1 Distribution of Engineering Drawings

Engineering drawings are distributed as indicated below.

The distribution of engineering drawings is coordinated through several sets of procedures (see 2.2, References). The following is a general overview of the drawing distribution process. See attachment A, Document Control Flowchart, for an overview representation. (The numbers on the flowchart correspond to the numbers listed below.)

1) Construction Services shall provide Document Services with the following:
   - The number of drawings needed.
   - The size of drawings needed.
   - The appropriate contacts at the construction site.

2) When Design is ready to transmit drawings to Construction Services, the appropriate Design discipline lead engineer electronically forwards the drawings to Document Services for processing.

   Document Services:
   - Loads the drawings into Documentum.
   - Makes the required number of hardcopies.
   - Notifies the onsite Construction Services Document Control contact person via E-mail of the drawing availability. (Refer to attachment B for instructions on how to access Documentum and attachment D for a sample of the E-mail notification.)

   Document Services generates a transmittal letter when transmitting hardcopies (similar to attachment C) and forwards the drawings to the appropriate onsite Construction Services Document Control contact person.

3) The onsite Construction Services Document Control contact person shall review the transmitted hardcopies for accuracy and completeness and notify Document Services of any discrepancies.

The onsite Construction Services Document Control contact person removes from the transmittal package the appropriate number of documents needed by the field office, then date stamps and files the transmittal letter. The remaining documents are distributed to the various contractors based on a predetermined distribution list. The onsite Document Control contact person imports the drawings information into the onsite Transmittal Tracking Database using the transmittal number (refer to attachment F).

4) Using the transmittal tracking database, the onsite Document Control contact person shall prepare a transmittal letter for each contractor, similar to attachment E. If the drawing status is any status other than Issued for Construction, the onsite Document Control contact person shall indicate the status of the drawing in the comments section of the transmittal letter. For example, if the drawing status is Advanced Print, Void, or Information Only, the onsite Document Control contact person adds this information to the transmittal letter.

Construction Services shall be responsible for ensuring a representative of each contractor signs the transmittal letter acknowledging the receipt of the documents. The onsite Construction Services Document Control contact person shall file a copy of each signed transmittal letter. To aid in controlling transmittals, an onsite transmittal sequence number may be used. The onsite Construction Services Document Control contact person shall assign these sequence numbers.

5) As indicated above, the transmittal tracking database allows the creation of a transmittal letter, similar to attachment E, directly from the database. This database pulls transmittal information from Documentum. It also creates a record of all drawings received and transmitted to the contractor including the date it was transmitted, the date it was signed by the contractor, and the onsite transmittal number. Attachment F is a general overview of this database. The Transmittal Tracking Access Database Instruction Manual is a complete user's guide and instruction manual.

6) With the exception of one copy maintained by the onsite Construction Services Document Control contact person, holders of the controlled copy shall destroy all previous revisions of drawings at the time a new revision is issued. If it is necessary to keep copies of prior revisions, the holder of the controlled copy shall stamp the drawing "Void – For Information Only."

NOTE

If previous revisions of drawings and the transmittal history associated with those drawings are maintained in Documentum and the onsite Transmittal Tracking system, onsite Construction Services Management may deem it unnecessary to maintain a copy of all voided drawings. At the completion of the construction project, disposition of all

controlled documents shall be in accordance with QC-I-01, Control of Quality Records.

4.2 Design Change Notices (DCN)

Design maintains control of procedure D3-02, Preparation and Distribution of Design Change Notices. D3-02 provides instructions for using Design Change Notices (DCN) and establishes the DCN as the formal mechanism for early transmittal of advance engineering design information to a construction group prior to formal drawing revision. Unless noted otherwise on the DCN, information on the DCN shall be treated as released-for-construction information.

The onsite Construction Services Document Control shall acknowledge receipt of the DCN from Design and shall formally transmit the DCN to all affected parties. DCNs are routed and tracked via the Project Management Information System (PIMS). PIMS Guideline 3A, Design Change Notice, details the proper completion of a DCN.

Construction Services shall monitor the DCN status, and when work is complete, shall close the DCN in PIMS.

All existing drawings and documents affected by a DCN shall be stamped with the DCN number or shall have a copy of the DCN attached.

(See Design D3-02 and/or PIMS guideline 3A for a Design Change Notice Process flowchart and a copy of the DCN form.)

4.3 Advance Print

The use of advance prints should be minimized on the construction site for actual construction activities. In situations when advance prints are required to meet construction schedules, the advance print document transmittal and/or retrieval process shall be documented and controlled.

NOTE
This process may vary from project to project.

The Construction Services Document Control contact person shall stamp an advance print as “ADVANCE PRINT”. The onsite Document Control contact person and all recipients of the advance print shall replace an advance print with the official issued-for-construction drawing as soon as Document Services transmits it via Documentum. The Document Control contact person and all recipients of the advance print shall stamp the replaced advance print VOID. If needed, one copy may be retained for record purposes.

4.4 Printing of Drawings from Documentum

To expedite the delivery of drawings to the construction site, many projects use the E-mail notification process discussed in 4.1, Distribution of Drawings, and print all drawings onsite. E&CS personnel can conduct simple drawing searches and print single drawings through the Documentum Web site. (Refer to attachment B for instructions on accessing the Documentum Web site.) However, to print the massive volume of drawings needed for the jobsite, the onsite Document Control staff will need to install the Documentum Desktop Client. (The Documentum Web site provides instructions for loading the Documentum Desktop Client.)

Drawings printed from Documentum intended for use by the contractor shall be transmitted through the onsite Construction Services document control.

4.5 CD Copies of Drawings

If allowed by the contract, in lieu of hard-copy drawings, projects may opt to create a copy of Documentum drawing images on a CD and send the CD to the contractor. The CD enables the contractor to print as many copies of the drawings as needed. A transmittal letter generated from the transmittal tracking database accompanies the CD sent to the contractor as it would hard-copy drawings.

NOTE

For some projects, Document Services is able to create the CD and send it to the onsite Construction Services Document Control contact person, saving the time and cost of creating the CDs onsite.

4.6 Miscellaneous Document Transmittal Tracking System

Each construction site shall establish a miscellaneous document transmittal tracking process to record the routing of important documents and correspondence generated during the course of a construction project. The transmittal tracking database has the capability of tracking miscellaneous transmittals. (This process is explained in detail in the Transmittal Tracking Access Database Instruction Manual.)

NOTE

The scope and magnitude of the construction project influences the type of miscellaneous transmittal tracking system to be used. Two important aspects of the tracking process include:

- Having documentation verifying contractors and other affected parties received and signed for all documents sent to them by Construction Services.

- Ensuring Construction Services is aware of documents sent to them by contractors and is able to review and respond to them in a timely manner.

4.6.1 Construction Miscellaneous Transmittal Form

The Construction Miscellaneous Transmittal Form (CMTF) is being developed in PIMS. The CMTF will route and control miscellaneous documents transmitted between the contractor and Construction Services. This form, once implemented, will allow either Construction Services or the contractor to transmit documents via the CMTF. The proper completion of a CMTF will be detailed in PIMS Guideline 2-H, Construction Miscellaneous Transmittal Form. On sites where the contractor has access to PIMS, the CMTF will become the primary method used to transmit miscellaneous documents between Construction Services and the contractor.

4.7 Assessment of Document Control

Periodically, the onsite Construction Services Document Control contact person shall:

- Review the controlled documents he or she and the contractors maintain to ensure only current documents are in use.
- Control all drawings used for construction, ensuring the latest revision. (See procedure QC-A-02, Oversight and Control of Contractor QC Programs, for a guide to establish the review criteria.)
- Document any discrepancies found in the contractors' documents and notify the contractor for immediate remediation. Recurring problems may require that a nonconformance report be issued (see procedure QC-H-01, Nonconformance Report).

Additional reviews of document control may be conducted by the Construction Services site quality lead and the Regional Corporate Quality Coordinator.

5.0 KEY CONTACTS

For questions regarding the content and implementation of this procedure, contact the appropriate Regional Corporate Quality Coordinator.

6.0 QUALITY RECORDS

The document transmittal forms discussed in this procedure are considered quality records and shall be stored and managed in accordance with Quality Procedure QC-I-01. These documents shall exist as hard-copy transmittals stored in Construction

Services Document Control and as electronic copies within the PIMS system. Transmittal data is stored and tracked in the transmittal tracking systems.

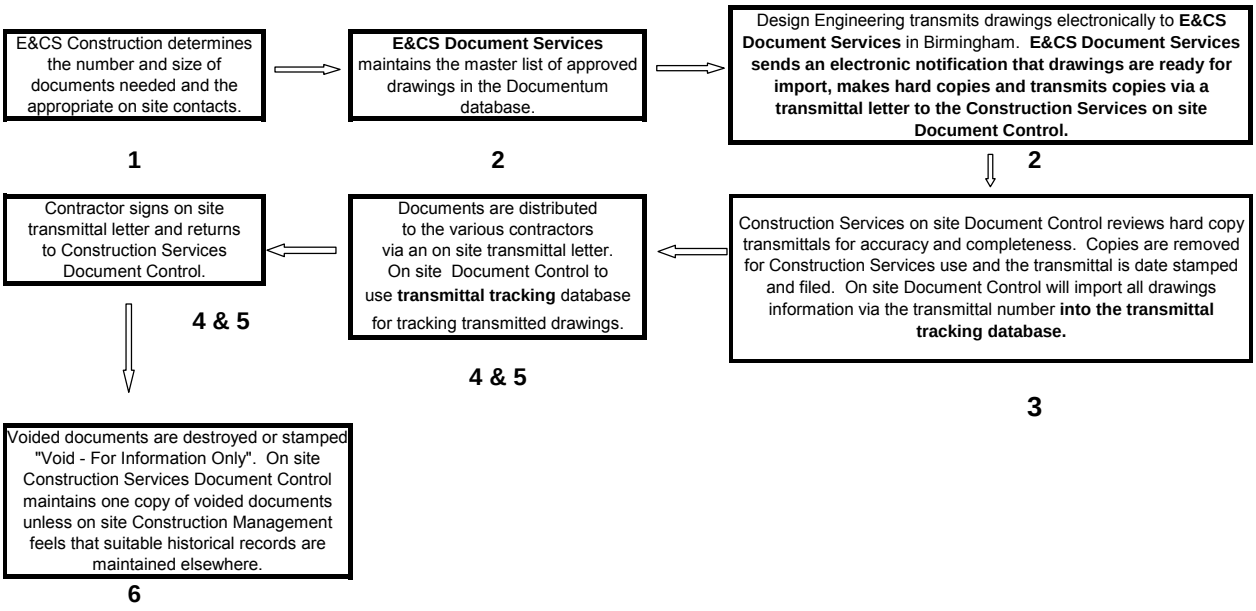
7.0 ATTACHMENTS

Attachment A – Document Control Flowchart
Attachment B – Document Services/Documentum Web site
Attachment C – Sample Document Services Drawing Transmittal Letter
Attachment D – Sample Document Services E-mail Notification
Attachment E – Sample Construction Services Document Transmittal Letter
Attachment F – Transmittal Tracking Database Input Screen

Attachment A – Document Control Flowchart

QC - B - 01
Document Control

Document Control Flow Chart



Attachment B – Document Services/Documentum Web Site

How to access the Web site:

Start at:
> Southern Today Home Page (on Southern Company intranet)

> Click on “Business Units and Departments”

> Click on “Southern Company Generation”

> Click on “Departments”

> Click on “Engineering and Construction Services”

> Click on “Documentum”

Click on “Documentum Drawing Simple Search” feature

OR

Click on “**Desktop Client (DTC) Documentum Interface**”

Attachment C – Sample Document Services Drawing Transmittal Letter

Southern Company Services
P.O. Box 2625 Birmingham, Alabama 35202

PROJECT: BOWEN 1&2 SCR
PROJECT NO. 010207
JOB NO.(S)

SYSTEM UPDATE DATE: 10/12/2001
TRANSMITTAL NO.: D016011

STATUS CODES:
3. APPROVED
6. PRELIMINARY
7. VOID
8. APPROVAL NOT REQUIRED (ERECTION DRAWINGS)
9. REVISED TO REFLECT "AS BUILT" CONDITIONS

TRANSMITTED FOR:
SCS ATLANTA/ P. WHITE/ SHH — 1A0568
BY DOCUMENT CONTROL — INTERNAL USE ONLY

IF ADDITIONAL ASSISTANCE IS REQUIRED
CONTACT DOCUMENT CONTROL (205) 992-7119

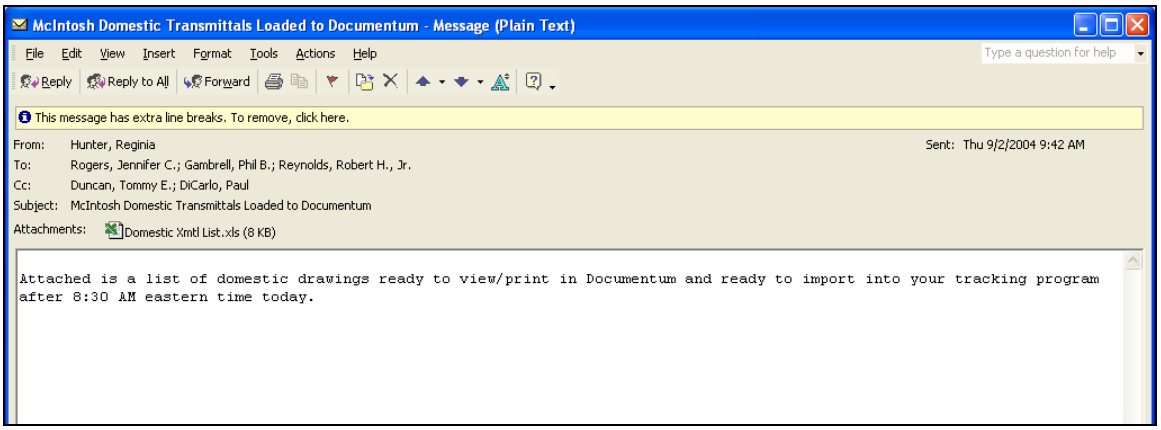
GPC		SCSA	
PLANT DOC. SPECIALIST	4 BPRT & 1 MFLM	TRANSMITTAL COORD.	LETTER ONLY
		GLENN KAROLYI	LETTER ONLY
POWER GEN. DOC. CONTROL	1 MFLM	ROB REYNOLDS	LETTER ONLY
CONSTRUCTION DOC.CONTROL	8 BPRT & 3 MPRT	LENORA BROWN	LETTER ONLY

DOCUMENT DESCRIPTION

STATUS	SCS DOCUMENT NO.	REV.	DOCUMENT TITLE (AND EQUIPMENT NUMBERS WHERE APPLICABLE)
3	E14107 SHEET 1	2	OUTDOOR CONCRETE - SCR AMMONIA TRENCH - TRENCH PLANS MKS 10-19
3	E14110 SHEET 1	1	AMMONIA STOR. & UNLOADING TRACK LAYOUT
3	E14111 SHEET 1	0	AMMONIA STOR. & UNLOADING TRACK SECTIONS & DETAILS
3	E14112 SHEET 1	1	SUBSTRUCTURE CONCRETE - SCR SUPPORT STRUCTURE FOUNDATION PLAN (WEST)
3	E14113 SHEET 1	4	SUBSTRUCTURE CONCRETE - SCR SUPPORT STRUCTURE FOUNDATION PLAN (EAST)
3	E14117 SHEET 1	1	SUBSTRUCTURE CONCRETE - SCR SUPPORT STRUCTURE CAISSON CAPS
3	E14118 SHEET 1	1	SUBSTRUCTURE CONCRETE - SCR SUPPORT STRUCTURE CAISSON CAPS
3	E14121 SHEET 1	0	STRUCTURAL STEEL - C&D PRECIP INLET DUCT SUPPORT STEEL & HANGER PLAN @ EL. 837'-0"
3	E14123 SHEET 1	0	STRUCTURAL STEEL - C&D PRECIP INLET DUCT SUPPORT STEEL
3	E14125 SHEET 1	0	STRUCTURAL STEEL - DUCTWORK C&D PRECIP INLET MANIFOLD DUCT ELBOW & Y SECTION @ BOILERHOUSE
3	E14126 SHEET 1	0	STRUCTURAL STEEL - C&D PRECIP INLET MANIFOLD ELBOW NO. 1A & 1B @ BOILERHOUSE
3	E14127 SHEET 1	0	STRUCTURAL STEEL - C&D PRECIP INLET DUCTWORK - SECTIONS & DETAILS
3	E14136 SHEET 1	1	STRUCTURAL STEEL - BOILERHOUSE PART PLAN @ EL. 907'-0" AND SECTIONS

Page 1 of 3

Attachment D – Sample Document Services E-mail Notification



Attachment E – Sample Construction Services Document Transmittal Letter

SOUTHERN COMPANY
Energy to Serve Your World™

Date: 11/20/2001

To: Williams Power

From: SCS Clean Air Construction - Field

Re: Document Transmittal Letter
GEM Transmittal Number: D010047
Site Transmittal Number: 001

Please find attached the following documents for your use:

Dwg No.	Sht.	Rev.	Ven. No.	Unit	Description	Full Size	Half Size	GEM Xmtl #
E538051	1	1		3	SCR ADDITION - STRUCTURAL STEEL PLAN @ H.P. EL. 440'-2"	4	2	D010047
E538068	1	1		3	SCR ADDITION - STRUCTURAL STEEL ELEVATION @ COLUMN LINE PB	4	2	D010047
E538078	1	0		3	SCR ADDITION - STRUCTURAL STEEL - SECTIONS & DETAILS	4	2	D010047
E538079	1	0		3	SCR ADDITION - STRUCTURAL STEEL - SECTIONS & DETAILS	4	2	D010047
E538311	1	0		3	CABLE TRAY RELOCATION - SUPPORT STEEL PLANS, SECTIONS & DETAILS	4	2	D010047
E538312	1	0		3	CABLE TRAY RELOCATION - SUPPORT STEEL - SECTIONS & DETAILS	4	2	D010047

I acknowledge the receipt of the above referenced documents:

_____ _____
Contractor's Representative Date

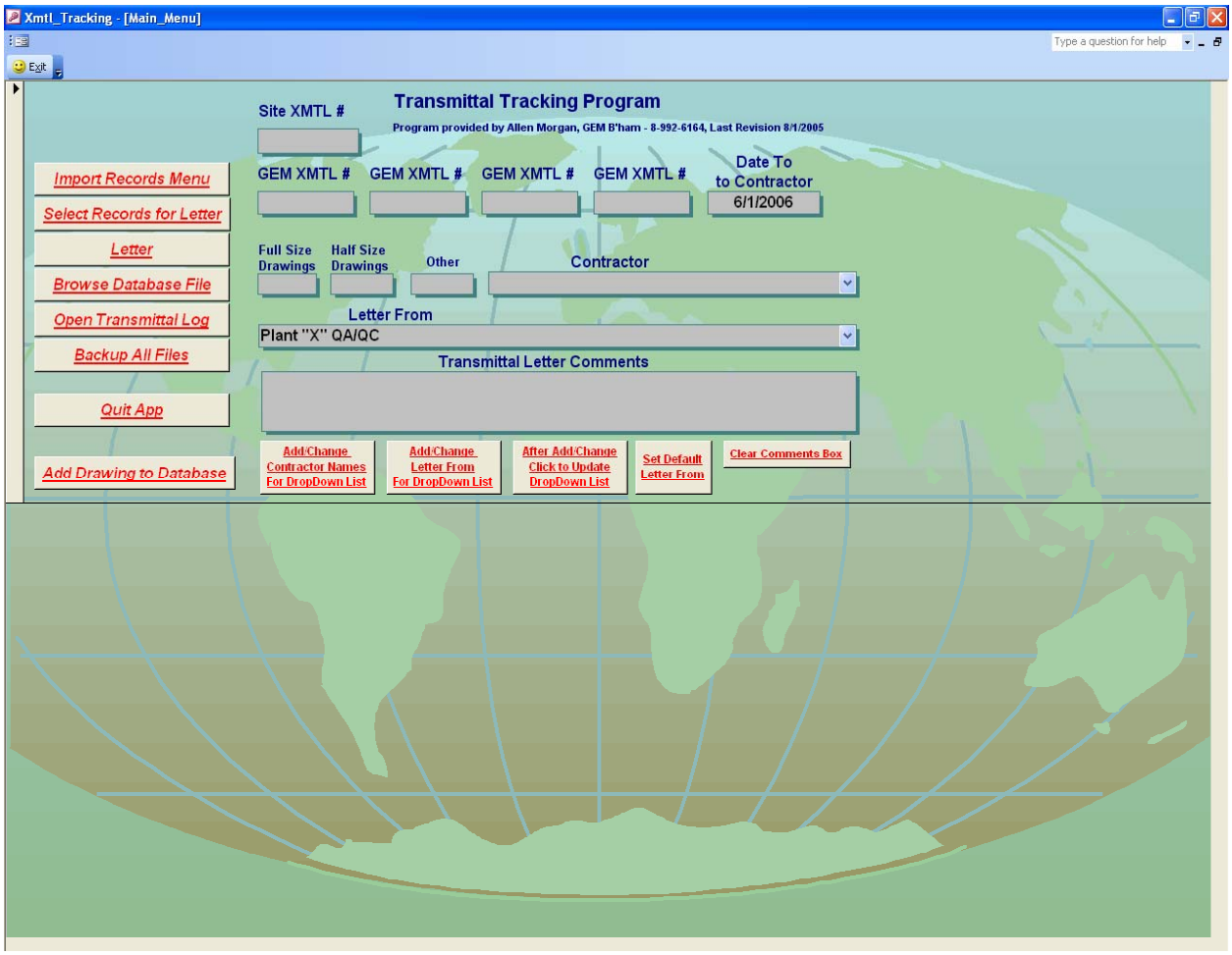
Page 1 of 1 Site Xmtl #: 001 GEM Xmtl #: D010047

Attachment F – Transmittal Tracking Database Input Screen

Overview

The Transmittal Tracking Access Database is password protected and is unique to each construction site. This database can be used to develop an onsite tracking system capturing the transmittal of all drawings to the contractors on the job and the date received (signed) by the contractors' representatives. The system will also generate a unique transmittal letter for each transmittal to each contractor. The screen below is the main input screen. This system imports drawing information directly from the Documentum system maintained by E&CS Document Services. This system can also be used to track miscellaneous transmittals.

Refer to the Transmittal Tracking Access Database Instruction Manual for specific information.



SCG Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – B – 02)

Field Change/Clarification Request

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	11/8/99
0	Issued for Construction	*RHR, Jr.*	*DMC*	*RWM*	11/17/99
1	General Revision, Including Renumbering to Fit QA Program Format	*RHR, Jr.*	*DMC*	*RWM*	3/6/00
2	General Revision, Including Department Name Change	*RHR, JR.*	*WCL*	*JBF*	1/31/02
3	Department name change; addition of FCR process flowchart; update attachments	*RHR, Jr.*	*WDP*	*JCH*	10/14/02
4	Incorporation of Best Practices by Administrative QC Review Committee: E. Boerner, C. Casey, T. Duncan and S. Lumsden	*RHR, Jr.*	*JBF*	*C.A. Baker*	02/14/05

QC – B – 02
Field Change/Clarification Request

Purpose

The purpose of this procedure is to document the proper processing of a field change and/or clarification **(FCR)** request. **A sample FCR form is attached along with a copy of the electronic version found in the "southernprojects.com" database. Whenever possible, the "southernprojects.com" process shall be used for processing FCR's.**

Scope

This request form shall be used for documenting changes and clarifications requested by SCG Engineering and Construction Services (E&CS) construction personnel. To expedite the processing of these requests, it is recommended that the **"southernprojects.com" process be used**. This form may also be used to document conversations that help clarify specifications and/or drawings and to expedite the review of drawings that have not been processed through the normal document control process (i.e. "bootleg" drawings).

This procedure is an integral part of the SCG **E&CS** Construction Services construction Quality Assurance Program.

Responsibility

This request form and subsequent procedure will be the responsibility of SCG **E&CS** Construction Services. The request will be initiated by field personnel with the status of the request being monitored by SCG E&CS through the use of a status log (refer to Attachment A) and/or the use of the **"southernprojects.com"** database.

Completion of the Request Form

The following items pertain to particular sections of the sample Field Change/Clarification Requests (FCRs) found at the end of this procedure. Please refer to Attachment **B** and Attachment **C** as you review this section of the procedure. **Attachment B addresses the use of a hard copy form and the use of a manual or spreadsheet type log sheet. Attachment C addresses the use of "southernprojects.com" for the distribution and tracking of the form.** Attachment **D** is a flowchart of the FCR process**.**

Attachment B

1) SCG E&CS will be responsible for maintaining the status log for all FCRs. FCR numbers shall be assigned in sequential order.

2) The date the initial request is filled out.

3) The resolution due date. This should be a realistic due date based on the needs of the job. "As soon as possible" should not be used as the standard.

4) Enter the name of the Plant and the Project in these boxes.

5) The requested change and/or clarification should be described in this section of the report.

6) Drawings and/or specifications affected or referenced in the change request should be listed in this section.

7) The requestor of the change/clarification should be listed here. Since the intent is to maximize the use of **electronic processing**, this does not have to be a signature. It is not required that the requestor be a SCG employee. For example, employees of a third party engineering, testing and/or survey company working for SCG may request that a FCR be initiated. However representatives of the general contractor or any of their subcontractors may not initiate a FCR**. Questions raised by contactors should be addressed on a "Request for Information" (RFI) form. The contractor should complete the RFI form and submit the form to Construction Services. If Engineering input is required, Construction Services may complete a FCR and forward the contractor's question to Engineering. On smaller projects, the RFI may be forwarded from Construction Services to Engineering.**

8) The name of the responsible engineer should be entered in this box. **Some examples of items that may require Engineering Approval include but are not limited to: any changes to design criteria; questions regarding discrepancies between design documents and/or drawings and clarification of issues that arise in the field.**

9) Comments related to **a suggested resolution** should be entered here before forwarding the FCR to Engineering.

10) The FCR must be approved by a SCG employee. That person should be indicated in this area of the request form. An original signature is recommended. However, if a signature is not required, the Approver must review and approve the FCR. The Approver's name shall not be typed in by the

Initiator or anyone other than the Approver. At this point in the process, the FCR should be emailed or faxed to the responsible engineer for action.

11) Upon review, the Responsible Engineer should address his response to the SCG employee indicated in either area **7** or 10.

12) The Responsible Engineer should check the appropriate response and add comments and instructions as appropriate.

13) If other documents are related to the FCR, their identification numbers should be noted here.

14) The Responsible Engineer should indicate if design documents will need to be revised.

15) The Responsible Engineer should sign (or if sending by email – type) his name and date the request. The request should now be faxed or emailed back to the field for disposition.

Note:
A notebook or file shall be maintained that contains a copy of all FCRs. Original FCRs shall be maintained if possible.

Field Change/Clarification Report Status Log

The master copy of the FCR Status Log will be maintained on site by SCG E&CS construction personnel. A copy is attached to this procedure as Attachment A. This log may be maintained as an electronic copy or paper copy. A FCR shall not be sent to Engineering until it has been assigned a number and entered on the log. Once a FCR has been received back from Engineering, SCG E&CS construction personnel shall complete the status log for this request.

Attachment C

If possible, the "southernprojects.com" website and database should be used for the routing and control of construction documents. Refer to the "southernprojects.com" operating instructions for basic information related to user groups, access, logins, passwords and document processing.

Following are basic instructions for the completion of the on line FCR form found in "southernprojects.com" and referenced in this procedure as Attachment C.

Item	Description
FCR No.	This is a sequential number generated by the system.

Discipline No.	This is a site generated number that allows the tracking and sorting of FCRs by discipline.
Plant Project Unit Number	These areas will be established for each project and will already be populated.
Project Reference Code	This code, if used, further defines the specific portion of a project when multiple packages are issued; i.e. SCR and FGD
Resolution Due Date	This should be a realistic due date based on the needs of the job
Affected Design Documents	Enter the appropriate information for related drawings
Requested By	Construction Services individual requesting that the FCR be initiated
Name of Responsible Engineer	Select the name of the responsible engineer from the drop down menu.
Engineering Discipline	Select the appropriate Discipline from the drop down menu
Description of Request	Enter sufficient information to describe the requested change and/or clarification in detail.
Proposed Solution	Explain in detail the recommended resolution from Construction Services
Response from Responsible Engineer – Your response to the above is ….	The Responsible Engineer should click the radio button that best describes his opinion of the Proposed Solution.
Exceptions/Clarifications	The Responsible Engineer should enter comments in this box.
Cross References	This feature allows you to link to other related documents: RFI, FWA, OCR, FCR or VDR.
Design Document(s) will be revised	The Responsible Engineer should click the appropriate “Yes” or “No” radio button.
Attachments	This feature allows the attachment of items not addressed under Cross References above; i.e. pictures.
Distribution List	Select the appropriate distribution list
Additional Email Notification	This feature allows the selection of additional contacts that were not identified in the Distribution List above.
Action Closed	Select Yes or No depending on the status of the FCR.
Last Updated By	Shows the last person to enter a change to the FCR
Submit/Cancel	Click on the “Submit” button to initially send the FCR or to post an update on the FCR to the database.
Respond to Post	This option will appear once the FCR has been entered into the database. To respond to the FCR, click on this button and complete the necessary information. Click on Submit to resend and repost to the database.

Distribution of the Completed FCR

The completed FCR shall either be attached to the relevant drawings and/or specifications referenced on the FCR or the affected drawings shall be stamped with the FCR number. The completed FCR shall remain a part of the drawings/specifications until such time as a revision is issued that contains the information referenced in the FCR. If appropriate, a copy of the completed FCR should be included in referenced files or related documents.

Consideration should be given to formally transmitting the FCR to the affected parties (contractors) via an on site transmittal letter and tracking system.

If the contractor and other affected parties do not have access to "southernprojects.com", then the FCR should be printed from the database and transmitted per a signed transmittal letter.

Document Control and Records Retention

All documents, including those maintained in "southernprojects.com", shall be retained and stored in accordance with procedure QC-I-01 Control of Quality Records and the Southern Company Records Retention Schedule.

Plant Miller SCR Project
Field Change/Clarification Request Status Log

Request Number	Date of Request	Initiator/SCS Approval	Responsible Engineer	Due Date	Description	Documents Affected	Resolution	Date Received from Engineering	Resolved By	Date Sent to Contractor	Date Closed

Attachment A

SOUTHERN COMPANY
Energy to Serve Your World®

Field Clarification Request

FCR No.:	Date:	Resolution Due Date:
1	2	3
Plant: 4	Project: 4	**Affected Design Documents**

Description of Request:	Document No.	Sheet No.	Rev. No.
5		6	

FCR Requested By: 7 | Date: 7

Name of Responsible Engineer: 8

Comments: 9

Approved By SCG E&CS Site Management: 10 | Date: 10

Response from Responsible Engineer

To: 11

Your request for the above is:

☐ Approved ☐ Not approved ☐ Approved with exceptions as noted ☐ Clarified as follows

Exceptions/Clarifications: 12

FWA:	DCN: 13	VDR:	DL:
NCR:	CCF:	OCR:	RFI:

Design Document(s) Will Be Revised: ☐ Yes ☐ No 14

Responsible Engineer Signature: 15 | Date: 15

Form 9-2440

Attachment B

SOUTHERN COMPANY
Energy to Serve Your World™

Southern Company 42 Inverness Parkway Birmingham, AL 35202 Online Project Ma

(FCR) Field Clarification Request

(FCR) Field Clarification Request (Log) - Forms - -

Post New | Search

Field Clarification Request

SOUTHERN COMPAN
Energy to Serve Your World™

FCR No.
FCR No. 1

Discipline No.

Plant
Project
Unit Number

Project Reference Code

Resolution Due Date mm/dd/yyyy

Affected Design Documents

Drawing No.	Rev.	Sheet

Requested By:

Name of Responsible Engineer

Contacts must be highlighted.
No Contacts

Hold Control key to select multiple contacts.

Engineering Discipline

Select one:

Description of Request

Attachment C
Page 1 of 3

Proposed Solution

Response from Responsible Engineer

Your request for the above is

- ○ Approved
- ○ Not approved
- ○ Approved with exceptions as noted
- ○ Clarified as follows

Exceptions/Clarifications

Cross-references

RFI (Request for Information)

Text: Link to RFI

Review RFI Logs

RFI#

OCR (Operating Change Request)

Text: Link to OCR

Review OCR Logs

OCR#

DCN (Design Change Notice)

Text: Link to DCN

Review DCN Logs

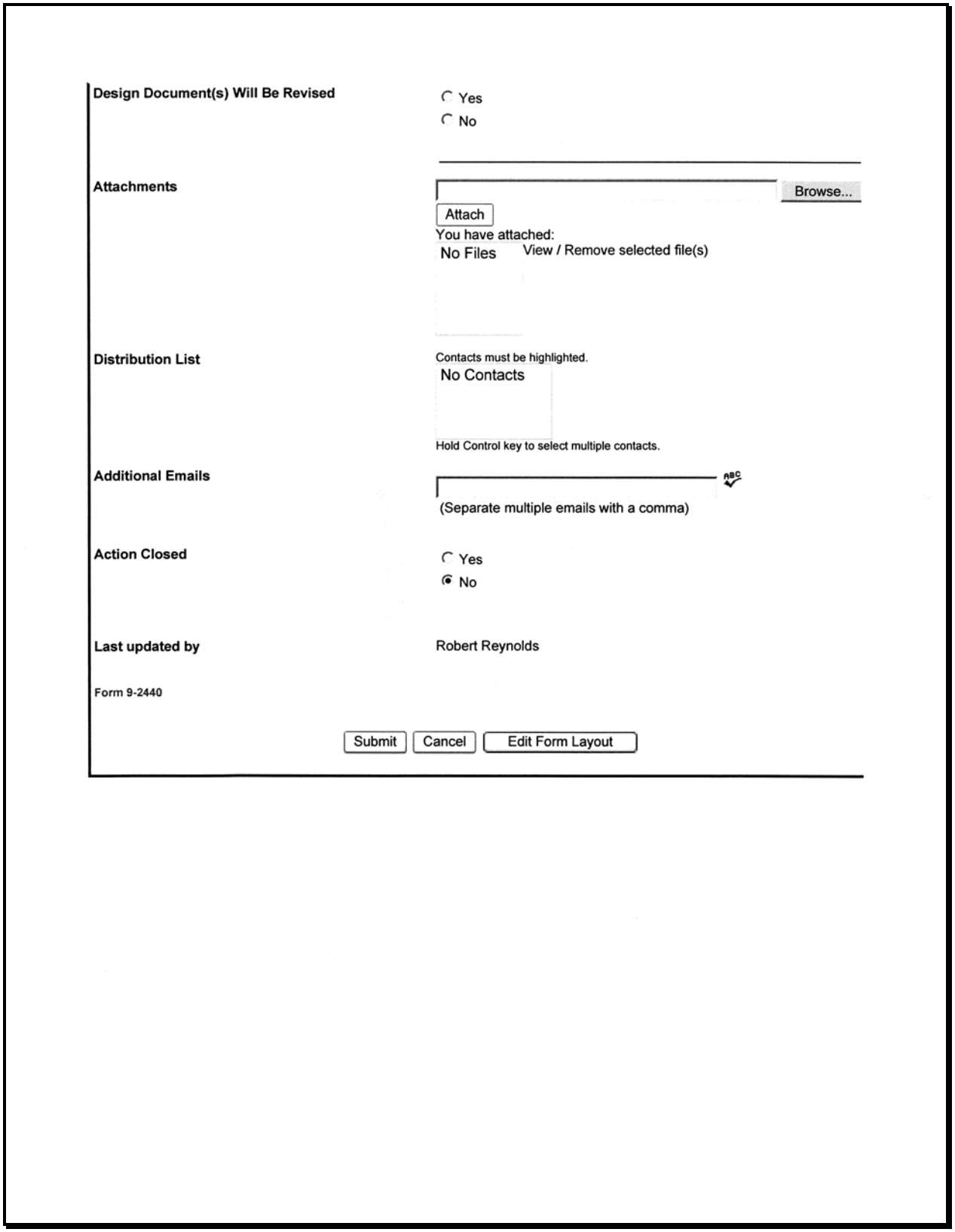
DCN #

NCR (Nonconformance Report)

Text: Link to NCR

Review NCR Logs

NCR#



Design Document(s) Will Be Revised

○ Yes
○ No

Attachments

Browse...

Attach

You have attached:

No Files View / Remove selected file(s)

Distribution List

Contacts must be highlighted.

No Contacts

Hold Control key to select multiple contacts.

Additional Emails

(Separate multiple emails with a comma)

Action Closed

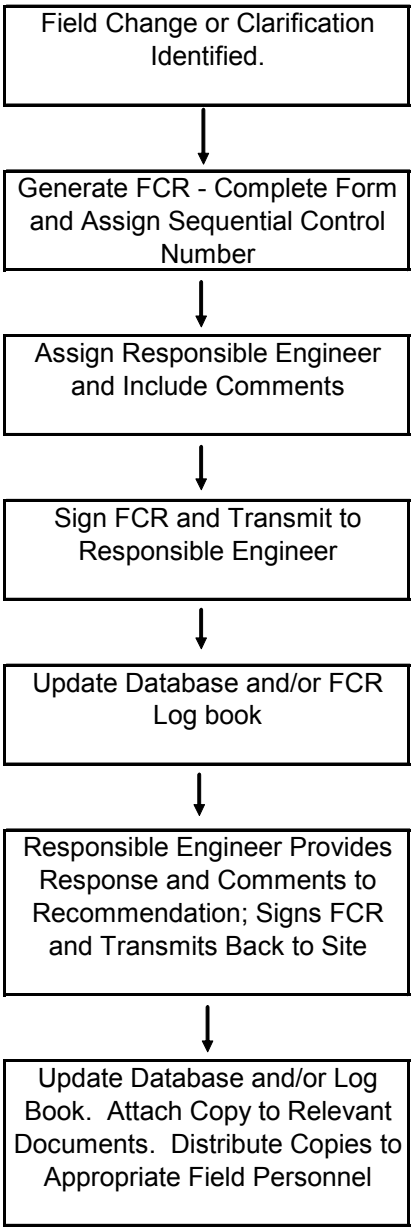
○ Yes
◉ No

Last updated by Robert Reynolds

Form 9-2440

Submit Cancel Edit Form Layout

Field Change/Clarification Request Flow Chart



***Note: When using "southernprojects.com" to process a FCR, the form is routed electronically and, since all data is stored in the database, there is no need to keep a separate log book.**

Attachment D

SCGEM Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – C – 01)

Qualification and Evaluation of Contractors

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	9/18/00
0	Issued for Construction	*RHR,Jr.*	*DMC*	*RWM*	12/18/00
1	Department name change; update Attachments A and B; editorial changes and clarifications	*RHR, Jr.*	*WSN*	*JBF for JCH*	11/26/02
2	Incorporation of Best Practices by Administrative QC Review Committee: E. Boerner, C. Casey, T. Duncan and S. Lumsden	*RHR, Jr.*	*JBF*	*A. Baker*	8/9/04

QC – C – 01
Qualification and Evaluation of Contractors

Purpose

The purpose of this procedure is twofold:

1) to outline the general guidelines for the periodic evaluation of the performance of contractors who are currently providing goods and/or services on SCGEM Engineering and Construction Services **(E&CS)** construction projects and

2) to outline the general guidelines for the qualification of potential contractors who have expressed a willingness to provide goods and/or services on SCGEM Engineering and Construction Services **(E&CS)** construction projects.

Scope

It is intended that the guidelines given in this procedure will be used for the qualification and/or evaluation of contractors who have either expressed a willingness to provide goods and services or are currently providing such services on SCGEM Engineering and Construction Services **(E&CS)** construction projects.

This procedure is an integral part of the SCGEM **E&CS** Construction Services construction Quality Assurance Program and is intended for use on SCGEM Engineering and Construction Services construction projects.

Responsibility

It will be the responsibility of SCGEM **E&CS** Construction Services personnel to implement and control the use of this procedure. **Construction Services shall work closely with Supply Chain Management in the implementation of this procedure, especially dealing with the qualification of contractors.**

Contractor Performance Review

Generally, the responsible SCGEM Engineering and Construction Services Construction **Site** Manager or designee will perform a performance evaluation (see Attachment A) on all contractors providing goods and services on the project. Contractor performance should be reviewed at least every twelve (12) months or at the completion of the contracted work, whichever is shorter. All ratings should be explained with comments giving as much detail as possible. Pertinent data should be used as backup or clarification. **Attachment A is an example of the evaluation form found in**

the SCGEM Chapter XII Contracts Guidance Manual. The results of the performance evaluation shall be considered confidential. The evaluation may be used as a guide to discuss performance with the contractor, but the completed form shall not be shared with or given to the contractor. The completed performance evaluation shall be maintained as a confidential document and shared with other SCGEM personnel on a "need to know" basis.

After completion of the contracted work, or at anytime deemed appropriate by SCGEM **E&CS** Construction Services management, a review session shall be held with the contractor to cover the contractor's overall performance. As indicated on Attachment A, the following areas should be addressed:

- Safety
- Schedule
- Budget
- Quality
- Coordination
- Environmental
- Responsiveness
- Administrative

An electronic copy of all completed performance evaluations shall be sent via email to the SCGEM **E&CS** Construction Services **Corporate** Quality Control Coordinator at 241 Ralph McGill Blvd., Atlanta, GA. These evaluations shall be maintained as confidential documents and shared with other SCGEM employees on a "need to know" basis. **A hard copy of all evaluations will be maintained in a confidential notebook by the Corporate QC Coordinator. In addition, an electronic copy will be forwarded to Supply Chain Management (SCM) for inclusion in the Contractor Performance database maintained by SCM. Construction Services employees needing access to this database should contact the Corporate QC Coordinator and SCM.** These evaluations may be used as input in determining qualified contractors for future projects.

On site copies of evaluations shall be considered confidential documents and shall be stored with the project records in accordance with procedure QC-I-01 Control of Quality Records.

Qualification of Contractors

Overview

SCGEM **E&CS** Construction Services, with input from Supply Chain Management, will maintain various lists of qualified contractors who have expressed a willingness to provide goods and/or services on Southern Company construction projects. These lists will be developed and maintained in a manner that will insure competitiveness, fresh ideas and innovation, minority participation, quality and safety.

The following information is provided as a guide only. The basis for identifying contractors may vary based on the work scope, complexity, criticality of work and number of available contractors.

Process

The development of a qualified contractor bid list shall be a multi – step procedure. This process is outlined as follows:

Step 1: Identify Work Scope - prepare a brief description of the scope of work being planned including any unique or special requirements

Step 2: Develop List of Potential Contractors – obtain a list of qualified contractors from Supply Chain Management. Identify potential contractors from other sources.

Step 3: Screen All Contractors Through Supply Chain Management – insure that any "new" potential contractors meet the requirements of the Supply Chain Management Department.

Step 4: Send "Supplier Evaluation Questionnaire" to Potential Contractors – **Contact Supply Chain Management and have them** send a copy of the Supplier Evaluation Questionnaire to any new potential contractors including a scope of work and any unique or special requirements**.** Contact Supply Chain Management for instructions **on** completing this **questionnaire** on line via the Internet.

Step 5: Perform Initial Evaluation of Completed Questionnaire – the completed questionnaires should be reviewed for completeness and relevance of the answers to the various questions. The contractor should be contacted as necessary to clarify their answers. References supplied by the contractor should be contacted and asked the following questions:

1) Why was the contractor chosen for the work?
2) What are the contractor's strengths?
3) What are the contractor's weaknesses?
4) What type of problems did you encounter?
5 Would you use this contractor again?

Step 6: Perform Site Visit – if the results of Step 5 are favorable, a site visit should be taken. The site that is visited should be as similar to the work that will be performed for Southern Company as possible. To add consistency to the information obtained on the site visit, a checklist similar to Attachment B should be completed as part of the site visit.

Step 7: Final Evaluation and Ranking of Contractors – once all the information mentioned above has been assembled and evaluated, the contractors shall be evaluated and ranked. This ranking shall be based on criteria similar to Attachment C. The weights or points assigned to each area may be changed

as appropriate for a particular scope of work. Generally, the higher the confidence level that the contractor meets the requirements of the particular category, the higher the point value assigned. A brief description of each category follows:

- o Recent Relevant Experience: is the contractor currently performing (or has he recently performed) work similar to the work anticipated for the upcoming Southern Company project(s)

- o Other Experience: has the contractor performed work that, although not directly related to the type of work anticipated for the Southern Company project, would nonetheless add valuable experience to the type of work anticipated

- o Use of Subcontractors: does the contractor tend to "sub" much of the work or use their own workers. Generally, the fewer the subs, the higher the point value.

- o Safety: based on site observations and data submitted, evaluate the contractor's safety record.

- o QA Program: based on site observations and data submitted, evaluate the contractor's QA program. Does the contractor have a written QA Program.

- o Customer Feedback: Based on the responses to Step 5 above and the on site visit,. evaluate the prior and current customer's responses.

- o Staff: evaluate the contractor's organization to determine their ability to manage the construction project.

- o Overall Assessment: based on all information reviewed, evaluate the contractor's overall ability to perform the anticipated work.

- o Total: determine the numeric total of all categories. The contractors with the highest scores should be added to the bid list. The size of the bid list should be based on such factors as: bid scope, complexity of the work and number of qualified contractors competing for the work.

Document Control

Completed questionnaires, site visit checklists, evaluation forms, lists of qualified contractors and other documents related to this process shall be maintained and controlled as confidential documents. **All documents shall be retained and stored in accordance with procedure QC-I-01 Control of Quality Records and the Southern Company Records Retention Schedule.**

Southern Company Generation

Contractor performance Evaluation

Plant:
Project:

Contractor		Sub Contractors (if any)	Recommended	
Contract Number:			Yes	No*
Job Superintendent				
Completion Date:				
Estimated				
Actual				
Price:				
Original				
Final				
Do You Recommend Contractor Stay on Bid List?				

*Explain on 2nd Page * Give Specific Details on any Category Marked "Fair" or "Poor"

DESCRIPTION	Excellent		Good		*Fair		*Poor
Overall Management of Work							
Quality of Work							
Construction Method and Techniques							
Ability to Man Job							
Labor Relations							
Worker Attitudes							
Supervision – Quality							
Supervision – Quantity							
Home Office Support							
Control of Sub Contractors							
Cooperation with Other Contractors and A/E's							
Communications with Owner							
Attitude with Correcting Errors							
Responsiveness to Owner's Requests							
Equipment Availability							
Tool Supply							
Invoicing Methods							
Job Cleanliness and Orderliness							
Cost Control							
Scheduling Control							
Quality Control							
Safety Program							
Environmental Stewardship							

Attachment A
Page 1 of 2

Schedule:		Cost:	
Ahead of Schedule		Less than Estimated	
On Schedule		As Estimated	
Longer than Schedule		Over Estimate	
Substantially Longer than Schedule		Substantially Over Estimate	

Extras: Yes No	Reasonable Requests:	Excessive Requests: *

COMMENTS

Prepared By: _____

Job Title: _____

Plant: _____

Date: _____

Attachment A
Page 2 of 2

CONTRACTOR SITE VISIT CHECKLIST

Contractor and Site Location: **Date: _____**
Scope of Work and Quantities:
Type Contract (LS, Unit Price, ETC)
Number of Personnel: **Management and Staff:** **Superintendents:** **Craft by Discipline:**
Union/Non Union **Long Term or Local Hire**
List of Subcontractors and Work Scope
Other Contractors On Site Requiring Interface **List with Scope**
Equipment and Material Procurement **Who Supplies?** **Types?** **Who Makes Take offs?** **Who Schedules Deliveries?**

CONTRACTOR SITE VISIT CHECKLIST
(CONTINUED)

Planning and Scheduling **Who scheduled work?** **Amount of Pre Award Scheduling?** **Method of Scheduling and Detail?**
Quality Control **Who Provides QC?** **Describe**
Safety **What is contractor's program?** **Competent person on site?** **Drug Testing?** **Safety Record?**
Other Functions/Services Provided by Contractor

CONTRACTOR SITE VISIT CHECKLIST
(CONTINUED)

Site Walkaround and Work Observations

Types of Work Observed

Work Quality

Productivity

Organization

Cleanliness

Safety

Quality Control

Owner Interviews

Why was this contractor chosen for this work?

What are the contractor's strengths

What are the contractor's weaknesses?

What types of problems have you encountered?

Would you hire this contractor again?

SCGEM employees conducting site visit and/or interviews:

_____ Date: _____

_____ Date: _____

CONTRACTOR EVALUATION WORKSHEET

Contractor	Recent General Civil/Elec./Mech. (25pts)	Other Experience (5pts)	Use of Subs (5pts)	Safety (5pts)	QA Program (5pts)	Customer Feedback (15pts)	Staff (5pts)	Overall Assessment (20pts)	Total

ATTACHMENT C

SCGEM Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – C – 02)

PURCHASE OF QUALITY ITEMS

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	11/8/00
0	Issued for Construction	*RHR, Jr.*	*DMC*	*RWM*	12/18/00
1	Department name change; minor editorial and clarification changes.	*RHR, Jr.*	*PBG*	*JCH*	10/15/02
2	Incorporation of Best Practices by Administrative QC Review Committee: E. Boerner, C. Casey, T. Duncan and S. Lumsden	*RHR, JR.*	*JBF*	*A. Baker*	8/9/04

QC – C - 02
Purchase of Quality Items

Purpose

The purpose of this procedure is to outline the guidelines for insuring that the specific requirements of products and materials that are critical to the quality of construction are conveyed and documented throughout the purchasing process. The end result of this process is the purchasing and receipt of the correct quality items. It is understood that approved Southern Company purchasing processes such as the Accounting Material and Procurement System (AMPS) and/or the Work Order Management System (WOMS) will be used for the purchasing of these quality items.

It is intended that this procedure will meet the requirements outlined in the SCGEM Chapter XII Contracts Compliance Manual.

Scope

This procedure only addresses items purchased by SCGEM **E&CS** Construction Services that affect the quality of construction. Examples include but are not limited to: reinforcing steel, structural steel, high strength bolts, cable and gas line piping. This procedure will not address such non-quality items as office supplies, office equipment, miscellaneous bolts and piping, cleaning supplies, etc. Additionally, this procedure does not apply to ASME construction work.

This procedure is an integral part of the SCGEM **E&CS** Construction Services construction Quality Assurance Program and is intended for use on SCGEM Engineering and Construction Services construction projects.

Responsibility

It will be the sole responsibility of SCGEM Engineering and Construction Services personnel and/or their designee to implement and control the use of this procedure. It will be the responsibility of the person requesting the purchase of materials to indicate whether the items are “quality” items **and to furnish all specification requirements**.

Procedure

To insure that critical information related to the quality items is conveyed throughout the purchasing process, the following steps should be followed:

Step 1: Identify quality items: Items that must meet certain specifications requirements or must replace specific components or equipment shall be identified. Requirements for these items shall be determined, documented and forwarded throughout the purchasing process. These requirements will be based on such criteria as job site specifications and/or drawings, industry standards, and specific requirements of replacement components or equipment.

Step 2: Prepare purchasing document: The specification requirements outlined in Step 1 above shall be included in the purchasing document (EWO, material requisition request, Purchase Order, etc.).

Step 3: Review of purchase document: The originator of the initial purchase request shall review the purchase document to insure all required specification information is correct. If the purchasing document is prepared electronically, via the Accounting Material and Procurement System (AMPS), the completed electronic material requisition must be routed to the original requestor. The original requestor must review the requisition and indicate approval by routing the requisition to Supply Chain Management or to the next level of approval.

NOTE: The last person reviewing the material requisition must forward the document to Supply Chain Management. If the material requisition is not forwarded to Supply Chain Management, the items will not be ordered.

Step 4: Purchase Items: Once the purchase document has been reviewed and approved, the purchase document shall be processed as expeditiously as possible.

Step 5: Receipt of Purchased Items: Purchased items should be received, stored and handled in accordance with procedure QC-D-01: Receipt, Storage and Handling of Products. As indicated in QC-D-01, items shall be inspected to the extent necessary to insure that the requirements of the purchasing document have been met.

Document Control

All purchase documents shall be filed and maintained throughout the construction process. At the completion of the construction project, this documentation shall be processed in accordance with procedure QC – I – 01: Control of Quality Records.

SCG Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – D – 01)

Receipt, Storage and Handling of Products

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	4/3/00
0	Issued for Construction	*RHR, Jr.*	*DMC*	*RWM*	5/30/00
1	Department Name Change; revise Document Control section; minor editorial changes	*RHR, Jr.*	*SKW*	*JCH*	11/4/02
2	Incorporate Best Practices by Civil, Electrical and Mechanical QC Review Committees	*RHR, Jr.*	*JBF*	*A. Baker*	8/9/04
3	Incorporate Department Name Change; Further define levels of storage and preventive maintenance requirements	*RHR, Jr.*	*JBF*	*C. A. Baker*	7/18/05

QC – D - 01
Receipt, Storage and Handling of Products

Purpose

The purpose of this procedure is to outline the general guidelines necessary to insure that the quality of items received on SCG Engineering and Construction Services (E&CS) construction projects is in compliance with manufacture's literature, applicable codes, standards and specifications and is maintained throughout the receipt, storage and handling process.

Scope

Generally, items shall be received, stored and handled in accordance with the manufacturer's recommendations. In addition, specific requirements listed in job site specifications shall be followed as they apply to items received on site. In lieu of recommendations and specifications, the guidelines listed in this procedure shall be followed.

This procedure is an integral part of the SCG E&CS Construction Services Quality Assurance Program.

Responsibility

Generally, it will be the responsibility of the contractors employed by SCG Engineering and Construction Services to insure that items received on site are received, stored and handled in a manner that will maintain the quality of the items received. SCG Engineering and Construction Services will perform whatever inspections are deemed necessary to insure the quality of items is being maintained. The contractor shall be responsible for implementing a comprehensive and/or computerized receipt, storage and handling plan.

Safety

Every employee has an individual responsibility for his or her personal safety and for the safety of others as well. Each employee should be knowledgeable of the safety rules applicable to his or her work. Employees must accept personal responsibility for cooperating and complying with all EH&S policies and procedures. Prior to beginning work, all employees shall review and have a thorough understanding of all applicable

safety procedures contained in the E&CS Construction Services EH&S Policies and Procedures Manual.

Receiving Inspection Requirements

A preliminary visual inspection shall be performed prior to unloading to determine if any damage occurred during shipping and to insure compliance to the applicable purchase order. Observations shall be made for the following:

- Fire
- Excessive Exposure
- Environmental Damage
- Tie Down Failure
- Rough Handling

Any indication of the above conditions shall be brought to the attention of the appropriate discipline leads, preferably before unloading. Receipt, storage and handling requirements for specific items may be found in the particular discipline inspection procedures: QC-G-01 Civil Inspection, QC-G-02 Electrical Inspection, QC-G-03 Mechanical Inspection and QC-G-04 Welding Inspection.

After unloading, the following areas should also be checked:

- **Identifications and Markings** – verify that identifications and markings are in accordance with applicable codes, specifications, drawings, purchase orders, etc.
- **Manufacturing Documentation** – assurance that the item received was fabricated, tested and inspected prior to shipment; if required, assure that mill test reports or other required documentation has been received and all items met or exceeded requirements.
- **Protection Covers and Seals** - assure covers and seals meet their intended function.
- **Coatings and Preservatives** – verification that coatings and preservatives have been applied in accordance with specifications and have not been damaged during shipment.
- **Physical Damage** – perform a closer inspection than what was done prior to unloading to check for broken, cracked, missing, deformed or misaligned parts.
- **Cleanliness** – perform a more thorough visual inspection to assure that accessible internal and external areas and components are free of dirt, mill scale, weld spatter, oil, grease, etc. as required by specifications or manufacturer's recommendations.

Results of the above inspection should be documented either on an Equipment/Material Receipt Inspection Report similar to Attachment A, or as part of a Daily Inspection Report.

Nonconforming Items and Incomplete Inspections

Items that have not been completely inspected or have documentation pending shall be isolated from acceptable items and identified with a hold tag (QC – H – 02). In addition to the above, nonconforming items shall also have a nonconformance report issued per procedure QC – H – 01.

Storage Requirements

Items shall be stored in a manner that will maintain the quality of the item and minimize the possibility of damage due to corrosion, contamination, deterioration or physical damage. The contractor shall be required to identify and maintain the location of all items received and stored**.**

First and foremost, items shall be stored in accordance with manufacturer's recommendations and job site specifications. In situations where these documents are not available, the following general **classification of items shall apply**:

1) **Level A**: **Items classified to Level A are those that are exceptionally sensitive to environmental conditions and require special measures for protection from one or more of the following effects: temperatures outside specified limits; sudden temperature changes; humidity and vapors; physical damage and airborne contamination. Items requiring Level A storage shall be stored in an area meeting all the requirements of Level B below. In addition the storage area shall have the capability to maintain temperature and humidity levels within specified limits, a ventilation system with filters to provide an atmosphere free of dust and harmful vapors and any other appropriate conditions required by the manufacturer or job site specifications.** Some items **that may require this level of storage are** special electronic equipment, **special** instrumentation, **and special materials such as chemicals that are sensitive to the environment**.

2) **Level B**: **Items classified to Level B are those that are sensitive to environmental conditions and require measures for protection from the effects of temperature extremes, humidity and vapors, physical damage and airborne contamination, but do not require the special protection required for Level A items. Level B items shall be stored within a fire-resistant, tear-resistant weather tight and well ventilated building or equivalent enclosure. The area shall be situated and**

constructed so that it will not be subject to flooding; the floor shall be paved or equal and well drained. Items shall be placed on pallets or shoring to permit air circulation. The area shall be provided with uniform heating and temperature control or its equivalent to prevent condensation and corrosion. The minimum temperature shall be 40°F and the maximum temperature shall be 140 °F or less if stipulated by the manufacturer or jobsite specifications. Items **that may require this level of storage are** instrumentation, batteries, welding electrodes **and wire**, switchgear, control panels, paints and coatings, motors, generators and **computers**.

3) **Level C: Items classified to Level C are those that require protection from exposure to the environment, airborne contamination and physical damage. Protection from water vapor and condensation is not as important as for Level B items. Level C items shall be stored indoors or in an equivalent environment with all provisions and requirements listed above for Level B with the exception that heat and temperature control is not required. Items that may require this level of storage include welding electrodes hermetically sealed in metal containers,** pumps, valves, compressors, fans, blowers, bolts, bagged cement and bagged grout.

4) **Level D: Items classified as Level D are less sensitive to the environment than those for Level C. Level D items** may be stored outdoors in an area marked and designated for storage, which is well drained, preferably gravel covered or paved and reasonably removed from the actual construction area and traffic. Items shall be stored on cribbing or equivalent to allow for air circulation and to avoid trapping water. **Items shall be positioned or covered to avoid trapping moisture in pockets or internally**. Items **that may require this level of storage** include reinforcing steel, structural steel, piping, tanks, and **jacketed** electrical cable.

Preventive Maintenance for Items in Storage

A preventive maintenance plan shall be in place for items in storage. All storage areas shall be inspected at least monthly to insure items are being storage in accordance with the proper storage area referenced above. In addition to the requirements mentioned above, the following items shall be checked and verified:

1) Items shall be stored in such a manner as to permit easy access for inspection or maintenance.

2) Items and containers shall be plainly marked and stored in such a manner to allow easy identification without excessive handling.

3) Equipment such as motor operated valves (MOVs), skids, motors, etc. that can not be stored in a controlled environment must have heaters energized to prevent condensation and corrosion.

4) Care shall be taken to insure that all keys and associated hardware received with shipments are properly controlled and routed to SCG E&CS Construction Services.

5) All covers, caps, plugs and other closures shall be kept intact. Covers removed for internal access shall be immediately replaced and resealed after completion of the purpose for removal.

6) Temporary preservatives shall be left intact during storage. Should reapplication of preservatives be required only those previously approved shall be used.

7) Items pressurized with inert gas shall be monitored at such a frequency as to ensure that the gas pressure is maintained within specified limits during storage.

8) Desiccant humidity indicators shall also be monitored and desiccants shall be changed or reprocessed when specified.

9) Instrumentation racks shall be energized as specified by the manufacturer.

10) Rotating electrical equipment shall be given insulation resistance tests on a scheduled basis.

11) The shafts of rotating equipment shall be rotated on a periodic basis. The degree of turn shall be established so that the parts receive a coating of lubrication, where applicable, and so that the shaft does not come to rest in a previous position.

12) Periodic maintenance inspection should be verified on checklists similar to Attachments B and C.

Handling Requirements

Handling of equipment and materials shall be done in accordance with manufacturer's recommendations. Hoisting equipment shall not be loaded beyond its safe operating range as certified by the equipment manufacturer. All lifting and rigging shall be done in accordance with appropriate safety requirements. Before beginning any lifting

operations, the E&CS Construction Services EH&S Policies and Procedures Manual mentioned above shall be reviewed and implemented as appropriate.

Care must be taken to insure that the handling of equipment and materials does not damage or any way degrade the quality of items being handled.

Document Control

Care shall be taken to insure that all packing slips, invoices, drawings, mill test reports, material safety data sheets, vendor supplied documentation etc., received with shipments, are properly controlled and routed to SCG E&CS Construction Services.

The contractor shall maintain a receipt inspection log of all items received. SCG E&CS Construction Services reserves the right to review this receipt inspection log and all the contractor's receipt, storage and handling procedures.

All relevant documents shall be filed, stored and maintained throughout the construction project. At the completion of the project, this documentation shall be processed in accordance with procedure QC-I-01: Control of Quality Records.

Equipment/Material Receipt Inspection Report

Date:

Tag/Mark/Identification Number:

Vendor:

Description of Shipment:

Serial/Heat/Lot Number:

Documentation Received

Storage Location

Complete This Section Before Unloading
Is there evidence of any of the following?

Yes	No		Yes	No	
☐	☐	1. Fire Damage	☐	☐	4. Tie - Down Failure
☐	☐	2. Excessive Exposure	☐	☐	5. Rough Handling
☐	☐	3. Environmental Damage	☐	☐	6. Item Damage

Item Inspection Checklist **Date:**

Use a check for conformance, an "X" for nonconformance or N/A

☐	1. Proper Documentation	☐	5. Physical Damage
☐	2. Identification and Markings	☐	6. Coatings and Preservatives
☐	3. Protective Covers and Seals	☐	7. Compliance to Drawings
☐	4. Cleanliness		

Comments

Receipt Inspector **Date:**

Attachment A

Plant/Project: _____ **Unit:** _____

Mechanical Equipment Maintenance Inspection Checklist

Description of Equipment: _____
Date Received: _____
No. Pages Attached: _____
Vendor Drawing Numbers:

On the following criteria give date of inspection or use N/A as needed

External Openings and/or Machined Surfaces Protected	_____		
Shaft Rotated	_____		
(Next Dates Required)	_____	_____	_____
Equipment Lubricated	_____		
(Next Dates Required)	_____	_____	_____
Purge Gas(Nitrogen Blanket) (Positive Pressure Maintained)	_____		
Moisture Barriers in Use	_____		
Internal Heaters Energized	_____		
Insulation Checks(Meggering)	_____		
(Next Dates Required)	_____	_____	_____
Follow up Inspections	_____		
(Next Dates Required)	_____	_____	_____

Inspection Notes _____

_____

_____

Contractor _____ **Date** _____

Inspector _____ **Date** _____

Attachment B

Plant _____ Unit _____
Electrical Equipment Maintenance Checklist
Exhibit 1

Equipment Number _____ Equipment location _____

Maintenance date _____ Number of pages attached _____

_____

	YES	NO	N/A	COMMENTS
Physical integrity of equipment • External openings and or machined surfaces protected				
• No visible signs of damage				
• Mechanical connections maintained				
Motor shaft rotates freely				
Bearings – greased, oiled or cleaned				
Commutator and slipring assembly maintained				
Barriers • Covers used to protect against physical damage and the environment				
• Heaters used to protect component against moisture or humidity				
Hydraulics, pneumatics • Liquid levels maintained (Record level)				
• Pressure values maintained (Record psig)				
• Oil Testing completed				
MSDS Report on file				
Interior compartment of equipment clean and free of debris				
Temporary connections complete				
Electrical tests complete List each test performed and results				
Follow up inspection required				
Construction HOLD TAG attached				

COMMENTS:

_____ _____

Signature Date

Attachment C

SCGEM Engineering and Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – E – 01)

PRODUCT IDENTIFICATION AND TRACEABILITY

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	11/8/00
0	Issued for Construction	*RHR, Jr.*	*DMC*	*RWM*	12/18/00
1	Department name change and minor editorial changes	*RHR, Jr.*	*RWM*	*J. C. Huggins*	*10/31/02*

QC – E – 01
Product Identification and Traceability

Purpose

The purpose of this procedure is to clarify those items used on **SCGEM Engineering and Construction Services construction** projects that require identification and traceability.

Scope

This procedure is an integral part of the **SCGEM Engineering and Construction Services construction** Quality Assurance Program and is intended for use on **SCGEM Engineering and Construction Services construction** projects.

Responsibility

It will be the sole responsibility of **SCGEM Engineering and Construction Services** personnel and/or their designee to implement and control the use of this procedure.

Overview

Generally, product identification and traceability will not be required for items received on **SCGEM Engineering and Construction Services construction** projects. As outlined in procedure QC – D – 01: Receipt, Storage and Handling of Products, documentation accompanying shipments shall be checked to ensure compliance to specifications and procedures. Identification and/or traceability beyond this point generally will not be required.

One exception is the identification and traceability of concrete. The acceptability of concrete, for example, will not be known until concrete samples are tested – generally 28 days from the date of the concrete placement. Identification and traceability of concrete shall be established by the use of approved concrete mixes, pour cards, batch tickets and concrete test reports. More specific information on the control of concrete can be found in procedure QC – G – 01: Civil Inspection.

Document Control

Documentation that establishes identification and traceability of products shall be filed and maintained through out the construction process. At the completion of the construction project, this documentation shall be processed in accordance with procedure QC – I – 01: Control of Quality Records.

SC**GEM Engineering and Construction Services**

Construction Quality Control Procedures

QC Procedure Number (QC – F – 01)

PROCESS CONTROL

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	12/13/00
0	Issued for Construction	*RHR, Jr.*	*DMC*	*RWM*	12/18/00
1	Department name change; minor editorial changes	*RHR, Jr.*	*GHS*	*John C. Huggins*	12/10/02

QC – F - 01
Process Control

Purpose

The purpose of this procedure is to identify those special processes that may occur on a **SCGEM Engineering and Construction Services construction** project that will require pre-qualification of the process. This pre-qualification will involve the review of the processes to:

- o insure conformance to industry standards, manufacturer's recommendations and job site specifications and procedures
- o establish monitoring and controls as appropriate to insure the desired results are obtained

Scope

Other processes not currently listed in this procedure, may, at the discretion of **SCGEM Engineering and Construction Services**, be added to this procedure on a case by case basis.

This procedure is an integral part of the **SCGEM Engineering and Construction Services construction** Quality Assurance Program and is intended for use on **SCGEM Engineering and Construction Services construction** projects.

Responsibility

It will be the responsibility of the contractor(s) employed by **SCGEM Engineering and Construction Services** to supply the required information for the special processes referenced in this procedure. **SCGEM Engineering and Construction** reserves the right to review and approve these proposed processes prior to the commencement of work.

Engineers and others preparing inquiry packages shall include appropriate sections of this procedure in their inquiry packages to insure that **SCGEM Engineering and Construction Services** has a through understanding of how the successful contractor plans to perform the particular process(es). Those individuals preparing inquiry packages should reference the section of this procedure entitled "Inquiry Packages" for suggested language.

Special Processes

SCGEM Engineering and Construction Services reserves the right to review and approve the special processes listed in Table 1 and 2 following. These lists may be amended as deemed appropriate by **SCGEM Engineering and Construction Services** based on the requirements of a particular project. Generally the contractor will be required to submit written procedures for all processes in Table 1 and 2 that are referenced in the particular inquiry package. However, as indicated below, **SCGEM Engineering and Construction Services** site management may waive the requirements for a written procedure for those processes listed in Table 2. Those processes listed in Table 1 will always require a written procedure from the contractor.

Table 1 – Written Procedure Required

- Welding
- NDE

Table 2 – Written Procedure May Be Required (Case by Case)

- Non Shrink Grouting
- Surface Preparation and Coating of Structural Steel
- High Strength Bolting
- Steel Fit-up and Dimensional Inspection
- Earthwork Operations
- Concrete Operations
- Piping Installation
- Installation of Equipment
- Installation of Electrical Systems
- Caisson Operations
- Piling Operations
- Installation of Fiberglass Components

For each process listed above and, any other process deemed appropriate by **SCGEM Engineering and Construction Services**, there shall be a review of the proposed procedure for performing this process. This review and/or meetings shall be held before the work begins. The contractor shall make reference to industry standards, manufacturer's recommendations, welding procedure specifications (WPS), job site specifications and procedures where possible. Attachment A should be used as a guide to insure that key areas are documented in the process procedure and/or discussed and documented in any process procedure meetings. Based on the particular process and how it will be applied on a particular job site, **SCGEM Engineering and Construction Services** site management reserves the right to waive the requirement for a written procedure from the contractor.

When reviewing the contractor's proposed process, **SCGEM Engineering and Construction Services** personnel shall review the inspection procedures included in this manual to insure that the "key inspection attributes" described in the inspection procedures can be verified. Those procedures are: QC – G – 01: Civil Inspection, QC – G – 02: Electrical Inspection; QC – G – 03: Mechanical Inspection and QC – G – 04: Welding Inspection. As necessary, the contractor's procedures shall be modified to allow the verification of the key inspection areas described in these referenced inspection procedures.

Inquiry Packages

Those **SCGEM Engineering and Construction Services** individuals preparing inquiry packages should use language similar to the following in the inquiry package. Reference shall be made to the appropriate processes in Table 1 and 2 above. Language similar to the following shall be included:

> "The successful contractor shall submit, prior to the start of work, written procedures in the following areas as they relate to the scope of work. A meeting will be held with the contractor prior to the start of work to discuss these processes. (*List processes here from Table 1 and 2)*
>
> The above referenced processes shall contain the following information:
>
> - Scope of work covered by the procedure
> - Key personnel involved in the process and their responsibilities
> - Relevant codes, standards, job site specifications that effect the process
> - Other relevant documents (mix designs, mill test reports, manufacturer's literature, etc.)
> - Procedural steps involved in the process
> - Special conditions that will need to be addressed
> - Key inspection areas and/or hold points
> - Acceptance criteria
> - Relevant forms, checklists, etc.
>
> **SCGEM Engineering and Construction Services** reserves the right, after reviewing the proposed processes, to request clarifications and or revisions as necessary."

Document Control

A copy of all written process procedures and discussions regarding special processes shall be documented and forwarded to **SCGEM Engineering and Construction Services**. All documentation shall be filed and maintained throughout the construction process. At the completion of the construction project, this documentation shall be processed in accordance with procedure QC – I – 01: Control of Quality Records.

PROCESS PROCEDURE KEY AREAS

- **Scope of work covered by the procedure.**
- **Key personnel involved in the implementation of the procedure and their responsibilities.**
- **Relevant codes, standards, job site specifications, procedures and drawings that effect the process.**
- **Other relevant documents such as mix designs, grout literature, welding procedure specifications, coatings literature, mill test reports etc. as they apply to the scope of work.**
- **Procedural steps involved in the process (explain in a logical manner how the process will be accomplished).**
- **Explain how special conditions will be addressed (for example, how hot and cold weather concreting requirements will be met).**
- **Explain key inspection areas and/or hold points.**
- **Define acceptance criteria.**
- **Include copies of all relevant forms, checklists, etc.**
- **Describe any issues that need to be resolved prior to the start of work.**

ATTACHMENT A

SCG Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – G – 01)

Civil Inspection

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	7/17/00
0	Issued for Construction	*RHR,Jr.*	*DMC*	*RWM*	7/26/00
1	Department name change; minor editorial changes	*RHR, Jr.*	*WDP*	*JCH*	11/4/02
2	Incorporate Best Practices by Civil QC Review Committee: M. Adkins, D. Presley, B. Lyon, M. Saunders	*RHR, Jr.*	*JBF*	*C.A. Baker*	3/8/05

QC – G - 01
Civil Inspection

Purpose

The purpose of this procedure is to outline the general guidelines necessary to assure that the civil construction activities performed on SCG Engineering and Construction Services construction projects are performed in accordance with applicable codes, standards, **specifications** and drawings.

Scope

This procedure will cover general inspection criteria in the areas of: **Survey Control,** Caisson Inspection, Piling Inspection, Soils Inspection, Reinforcing Steel Inspection, Concrete Inspection, Grouting Inspection, Structural Steel Inspection, Coatings Inspection, and **Ductwork Inspection and Insulation.**

Construction activities and subsequent inspection criteria shall be based on job site specifications, procedures and drawings. In lieu of jobsite specifications or where referenced by jobsite specifications, national codes and standards shall be used. Samples of these documents are listed under the section “Reference Documents”.

This procedure is an integral part of the SCG Engineering and Construction Services construction Quality Assurance Program.

Responsibility

Generally, it will be the responsibility of the contractors employed by SCG Engineering and Construction Services to insure that construction activities are performed in accordance with applicable specifications, procedures, drawings, codes and standards. SCG Engineering and Construction Services reserves the right to perform whatever inspections and tests are deemed necessary to insure that construction activities are being performed in accordance with job requirements and/or to require contractors and/or testing agency personnel to perform these inspections and tests. SCG Engineering and Construction Services also reserves the right to review the qualifications of all contractor and/or testing agency personnel performing inspections and/or tests, and to request that personnel be replaced if their qualifications are not appropriate for the inspections and tests being performed.

Reference Documents

Following is a partial list of reference documents that **may be useful in the implementation of this procedure.**

- ACI Concrete Field Testing Technician Grade I Training Manual
- ACI Manual of Concrete Practice
- AISC Manual of Steel Construction
- ASTM Volume 01.04 Steel – Structural, Reinforcing, Pressure Vessel, Railway
- ASTM Volume 01.08 Fasteners; Rolling Element Bearings
- ASTM Volume 04.01 Cement, Lime; Gypsum
- ASTM Volume 04.02 Concrete and Aggregates
- ASTM Volume 04.08 Soils and Rock (Part 1)
- ASTM Volume 04.09 Soils and Rock (Part 2)
- AWS D1.1 Structural Welding Code - Steel
- Corps of Engineers Standards:
  - CRD C611 – Test Method for Flow of Grout Mixtures (Flow Cone Method)
  - CRD C621 – Specifications for Non Shrink Grout
- CRSI Manual of Standard Practice
- CRSI Placing Reinforcing Bars Handbook
- SCG Inspection of Caissons Training Manual
- SCG Inspection of Grading, Excavation and Compacted Fill (Soils Inspection) Training Manual
- SCG Inspection of Piling Training Manual
- SCG Inspection of Reinforcing Steel Training Manual
- SCG Structural Steel Inspection Training Manual
- PCA Design and Control of Concrete Mixtures Manual
- SSPC Inspection of Coatings and Linings Handbook
- SSPC Surface Preparation Standards
- SSPC Vis 1 – Visual Standard for Abrasive Blast Cleaned Steel
- SSPC-Vis 2 – Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces
- SSPC Vis 3 – Visual Standard for Power and Hand Tool Cleaned Steel

Safety

Every employee has an individual responsibility for his or her personal safety and for the safety of others as well. Each employee should be knowledgeable of the safety rules applicable to his or her work. Employees must accept personal responsibility for cooperating and complying with all EH&S policies and procedures. Prior to beginning work, all employees shall review and have a thorough understanding of all applicable safety procedures contained in the E&CS Construction Services EH&S Policies and Procedures Manual.

Survey Control

It will generally be the contractor's responsibility to furnish his own survey crew and to establish survey control for the ongoing construction based on previously established control monuments. The contractor shall establish and maintain survey control to the accuracy required to meet industry and job site standards and requirements. The contractor may hire a separate survey company in lieu of using in house personnel, but may not use the same survey crew and/or company currently employed by Construction Services. Construction Services reserves the right to review and approve the qualifications of the third party survey company.

Construction Services also reserves the right to perform its own independent surveys to confirm compliance to industry and job site standards and requirements.

Caisson Inspection

Caisson construction shall be performed in accordance with job site specifications, procedures and drawings. Caisson inspection shall be performed by qualified personnel who shall verify that requirements of the specifications, procedures and drawings are being met. The caisson inspector shall complete a report similar to Attachment A for each caisson drilled.

In addition to the key inspection items listed on Attachment A, the following items may be required:

- Daily Inspection Reports or log book documenting construction progress
- Observation and documentation of acceptable load testing of dowels
- Observation of mixing and testing of dowel grout for required compressive strength
- Inspection of rebar and placement of rebar cage in the caisson
- Inspection of concrete placement operations

Documentation

Generally, a file shall be maintained for each caisson. Included in this file, as a minimum, should be the following information:

- Daily Inspection Reports or copies of daily log entries
- Detailed Caisson Inspection Report similar to Attachment A
- Documentation on acceptable dowel grout compressive strength and load testing of dowels
- Completed Concrete Pour Card – refer to Attachment **L**.
- Concrete Test Report documenting fresh concrete tests and compressive strength tests – refer to Attachment **M**.

- Copies of any Design Change Notices, Field Change Requests or Nonconformance Reports related to the particular caisson
- Copies of asbuilt sketches generated by the survey crews documenting actual final location of the caisson

These files should be maintained throughout the construction process. At the completion of the project, these records shall be processed in accordance with procedure QC-I-01 Control of Quality Records.

Piling Inspection

Piling construction activities shall be performed in accordance with job site specifications, procedures and drawings. Piling inspection shall be performed by qualified personnel who shall verify that requirements of the specifications, procedures and drawings are being met.

Key Inspection Attributes
The following are minimum key inspection items that should be checked and or verified during the construction process:

- **proper location and layout**
- blow count (hammer blows per foot)
- plumbness or inclination
- **preparation of asbuilt drawings**
- proper type of pile
- damage to the pile prior to, during and after driving
- proper penetration to required bearing capacity
- **heave observations**
- **hammer performance**
- final pile tip elevation
- butt elevation before and after driving piles
- splices (if required)
- tip diameter (as applicable)
- butt diameter (as applicable)
- **concrete volumes (as applicable)**

Documentation
A daily record or log should be maintained on all piling operations. These daily activities may be recorded on a daily inspection report or on form**s** similar to Attachment B **and C**. **These** form**s may need** to be modified for the particular type of piling operation. These reports should be maintained throughout the construction process. At the completion of the project, these records shall be processed in accordance with procedure QC-I-01 Control of Quality Records.

Soils Inspection

Earthwork construction activities shall be performed in accordance with job site specifications, procedures and drawings. Soils inspection shall be performed by qualified personnel who shall verify that requirements of the specifications, procedures and drawings are being met.

Key Inspection Attributes
The following are minimum key inspection items that should be checked and or verified during earthwork operations:

- **proper equipment and method to achieve required compaction**
- proper foundation preparation
- backfill is performed with acceptable material
- lift thickness of backfill material
- proper material moisture content
- adequate compaction
- testing frequency
- verification that field tests on fill material are compared to the proper Proctor test
- verification that backfill around pipes and other structures is performed in accordance with site specifications (generally thinner lift thickness and hand power tampers)
- verification that field tests are performed in accordance with ASTM standards and that compaction test results meet or exceed job specification requirements

Daily Inspection Report
In addition to the appropriate test data reports required for each field test, a Daily Inspection report may be required. Although particular requirements may vary based on job site requirements, the following basic minimum requirements should be noted on **a** Daily Inspection report **or equivalent document**. **This data may be documented on line as part of a Daily Log using the Southern Projects database.** Refer to Attachment **D** for an example.

- Indicate all pertinent information and activities related to the key inspection activities noted above:
  - Type material encountered
  - Type and amount of equipment being used
  - Date, weather and temperature
  - Area(s) being worked
  - Number and type of personnel involved in the work
- Indicate any irregular activities:
  - Failing tests
  - Equipment failure
  - Sudden changes in the weather
  - Changes in material encountered
- Be accurate, concise and neat:

Test Reports
Test results should be recorded on test reports similar to Attachment **E – K**. These test reports allow for the recording of the following test results:

- Attachment **E**: Moisture Content of Soils – Direct Heat Method
- Attachment **F**: Particle Size Analysis of Soils
- Attachment **G**: Atterberg Limits
- Attachment **H**: Moisture Density Relations of Soils – Proctor Test
- Attachment **I**: Sand Cone Method of Field Testing
- Attachment **J**: Drive Cylinder Method of Field Testing
- Attachment **K**: Nuclear Gauge Method of Field Testing

After review by SCG **E&CS** Construction Services, these reports should be filed and maintained throughout the construction process. They should be processed in accordance with procedure QC-I-01 Control of Quality Records.

Reinforcing Steel Inspection

Reinforcing steel shall be received, stored and handled in accordance with procedure QC-D-01 (Receipt, Storage and Handling of Products). As part of the receipt inspection, mill test reports shall be checked against the appropriate ASTM standards and fabricated bars shall be randomly checked against the bar lists for compliance. Any nonconforming items shall be processed in accordance with procedure QC-H-01.

Key Inspection Attributes:
In addition to the receipt inspection items listed above, the following are minimum key inspection items that should be checked and or verified as a part of reinforcing steel inspection:

- reinforcing steel is stored off the ground in a well drained graveled laydown area in accordance with the storage requirements listed in QC-D-01.
- reinforcing steel is installed per the drawings (note location, spacing, number, type and size of bars placed).
- reinforcing steel has **at least** the **minimum** amount of concrete **cover** on outside edges as specified on the drawings.
- cleanliness of the reinforcing steel. Verify that all mud, oil, excessive rust, etc. has been removed from the reinforcing steel.
- reinforcing steel lap splices are of the length specified on the drawings.
- mechanical splices (if required) are installed per manufacturer's recommendations.
- reinforcing steel is tied securely and will not move or be dislodged during concrete placement.
- the Pour Card has been signed indicating that the reinforcing steel is ready for concrete placement.

Concrete Inspection and Testing

Concrete construction activities shall be performed in accordance with job site specifications, procedures and drawings. Concrete inspection and testing shall be performed by qualified personnel who shall verify that requirements of the specifications, procedures and drawings are being met. Tests of concrete required to determine compliance to specifications shall be made by a certified ACI Concrete Field Testing Technician Grade I or equivalent.

Unless specified elsewhere in the specifications and/or drawings, a minimum of six concrete cylinders shall be made and will be considered a set. Unless stated elsewhere, the cylinders will be tested as follows: 2 cylinders at 7 days, 2 at 28 days and 2 held in reserve. Test results should be recorded on a spreadsheet and in a manner consistent with QC procedure QC-I-03: Statistical Techniques. Unless noted otherwise in plan specifications or drawings, one set of cylinders shall be made for every 150 cubic yards of concrete placed as outlined in ASTM C 94. At least one set of cylinders shall be made on each day concrete is placed regardless of the quantity of concrete.

Using QC procedure QC-F-01: Process Control as a guide, Construction Services should schedule a meeting with the contractor prior to the first concrete pour. The purpose of this meeting is to allow the contractor to describe his plans for the concrete pour including all the areas listed in this section of the procedure. The contractor should include the qualifications of key personnel and the plan for training new employees.

Batch Plant Inspection

SCG **E&CS** Construction Services reserves the right to inspect any and all concrete batch plants that will be supplying concrete to the construction site. A “walk through” inspection should be performed prior to the start of concrete production. If deemed necessary, inspections may be performed during concrete production. Following are key inspection items for each type of batch plant inspection:

Initial Inspection

- verify that aggregates are loaded in correct bins
- verify that aggregates are not contaminated
- verify that scales and measuring devices have current calibration stickers and appear to be working properly
- verify that the plant has a current ASTM, NRMCA, DOT or equivalent certification
- verify that concrete trucks are in good working condition
- verify that overall operation of the plant appears to be professional, orderly, reasonably clean, well maintained, etc.

- verify that batch plant operators appear knowledgeable (look for certificates or certifications)
- verify that batch tickets will supply necessary information (amount of hold back water, list of ingredients, batch times, size of load, indication of mix ordered, etc.)
- **verify that the plant and delivery equipment can produce uniform concrete per the requirements of ASTM C-94**
- **insure that the plant and delivery equipment can meet the capacity requirements of the job**

During Concrete Production (if required):

- verify that correct mix has been loaded into the batch plant computer
- verify that equipment is working properly (admixture dispensers, scales, moisture indicators, etc.)
- verify that truck counters have been reset to zero once the mixing water has been added to the mix
- verify that water used to "wash down" the concrete truck prior to leaving the plant area does not enter the concrete mix
- verify that the amount of hold back water is indicated on the batch ticket
- have a reasonable level of confidence that the concrete leaving the plant will meet specifications for temperature, air content and slump (testing at the plant should be done as deemed necessary)

Concrete Mix Design

All proposed concrete mixes must be submitted to SCG Engineering and Construction Services for review and **acceptance** prior to use. The proposed mixes submitted for use shall include a concrete strength break history as specified in ASTM C94 and shall contain acceptable test results and/or certificates of conformance on all ingredients that will be used in the particular concrete mixes.

Concrete Pre placement

Concrete pre placement construction activities shall consist of foundation preparation, rebar and embed placement, form construction and all other activities necessary to prepare for concrete placement.

Key Inspection Attributes

Following are minimum key inspection items that should be checked and/or verified prior to concrete placement:

- verify that the concrete foundation surface has been cleaned of any laitance
- verify that the concrete foundation surface has been sufficiently roughened to provide adequate bonding to the new concrete
- verify that all trash (mud, dirt, paper) has been removed from the placement area
- verify that the placement area is damp but not wet

- verify that all puddles of water have been removed
- in the case of a soil foundation, verify that it has been properly compacted
- verify that forms appear sufficiently sturdy to support the weight of the wet concrete
- verify that the forms are clean and free of foreign materials
- verify that form release agent has been applied to the forms
- verify that large holes and cracks have been filled to prevent mortar loss
- verify that the reinforcing steel has been properly installed (secure, properly spaced and placed, proper clearance between reinforcing steel and the form work and free of all foreign material)
- verify that all embedded items have been properly installed (secure, properly spaced and placed, free of all foreign material)
- verify that the placement area is clean and free of foreign material
- verify that necessary precautions have been taken for hot or cold weather concreting
- verify that arrangements have been made to allow for the proper storage of concrete cylinders **per ASTM C31**
- verify that arrangements have been made to allow for the proper placement of the concrete
- verify that the Concrete Pour Card has been signed and filled out properly by all involved parties (refer to Attachment **L**)

Concrete Placement

Concrete placement activities shall consist of the actual placing of the concrete and all testing that is required on the fresh concrete prior to and during placement.

Key Inspection Attributes

Following are minimum key inspection items that should be checked and/or verified prior and during concrete placement:

- Prior to depositing concrete in the placement, verify that the concrete has been tested for slump, air content, temperature, etc. and verify that it met all specification requirements (concrete test results should be recorded on a form similar to Attachment **M**)
- Prior to concrete placement, verify that the concrete truck tickets have been received and reviewed for items such as: amount of hold back water available, time of batching, size of load, proper mix designation
- verify that the concrete truck tickets and batch tickets are attached to the concrete test report (Attachment **M**)
- verify that the concrete is being placed to allow for proper consolidation and prevent segregation
- verify that the concrete is being properly vibrated
- verify that special care is being taken around sumps, tanks, etc. to provide for adequate consolidation and prevent the formation of air pockets
- verify that testing is being performed at the frequency and at the location required by the specifications

- verify that the concrete is being finished per the requirements of the specifications or drawings

Concrete Post Placement

Concrete post placement activities shall consist of application and maintenance of curing compound or other methods of curing, form removal, concrete repair and storage of concrete cylinders. **The contractor shall demonstrate to Construction Services that curing has been maintained by the submittal of curing records similar to Attachment L page 2.**

Key Inspection Attributes

Following are minimum key inspection items that should be checked and/or verified as part of concrete post placement activities:

- verify that the required method of curing has been initiated
- verify that the placement is checked regularly to insure continuous curing (watch for dry spots)
- verify that curing is maintained as long as required.
- verify that severe weather precautions have been taken as required (hot or cold weather) **as specified in ACI 305 and ACI 306**
- verify that concrete forms have been left in place as long as required to insure that form removal will not damage the concrete or workers (be cautious of forms supporting the weight of the concrete to insure the concrete has gained sufficient strength to support its own weight)
- If repair of concrete is required, verify that it is repaired in accordance with specifications (based on the severity of the repair, determine if a nonconformance report is required)
- verify that concrete cylinders are being stored on site in accordance with ASTM and job site requirements
- verify that concrete cylinders are shipped to the testing laboratory and subsequently tested in accordance with ASTM and job site requirements

Documentation

The Concrete Pour Card (Attachment **L**) and Concrete Test Report (Attachment **M**) and all supporting documents related to the concrete pour should be placed in the master file for the particular concrete pour. These files should be maintained throughout the construction process and processed in accordance with procedure QC-I-01 Control of Quality Records. **A labeling system shall be developed for the project that maintains traceability between the concrete test report and the Concrete Pour Card.**

Grouting Inspection

Non shrink structural grout shall be shipped to the job site in bags and shall be received, stored and handled in accordance with procedure QC-D-01 (Receipt, Storage and Handling of Products). Specifically, bagged grout shall be stored in accordance with

QC-D-01 “Storage Requirements” – Item #2. Any nonconforming items shall be processed in accordance with procedure QC-D-01 and procedure QC-H-01. Construction Services shall be given the opportunity to review manufacturer’s literature, including compressive test results, prior to the grout being used on the job site.

The contractor shall submit his procedures, suggested vendors and manufacturer’s literature along with the proposed plan for placement to Construction Services for review prior to the first placement. This procedure should list the qualifications of key personnel and the plan for training new employees.

Grout Placement

Non shrink grout shall be mixed, placed, cured and tested in accordance with the manufacturer’s recommendations and/or job site specifications and procedures. **A Grout Pour Card similar to Attachment N should be initiated and completed for all grout pours.**

Key Inspection Attributes

Following are minimum key inspection items that should be checked and/or verified as part of grout placement activities. **Attachment O should be used as a guide when verifying these areas:**

- **verify that the grout meets the requirements of the job in regard to intended use, required compressive strength and workability**
- **check the date on the grout bags to insure that the grout has not exceeded the indicated shelf life**
- verify that the concrete foundation that will receive the grout has been cleaned, roughened and saturated with water for 24 hours prior to grout placement.
- **complete Page 1 of the Grout Pour Card**
- verify that the grout has been mixed per manufacturer’s literature. It is recommended that a test batch be mixed **prior to the first production placement** to verify that workability and compressive strength requirements are met.
- verify the temperature of the mixed grout to insure compliance to specifications and/or manufacturer’s literature. Ice water or hot water should be considered as means of regulating the mixed grout temperature.
- verify that grout forms have been constructed to facilitate rapid, continuous placement and complete filling of the space to be grouted.
- verify that, depending on the size of the grout placement, the form on the grout placing side has been constructed at a 45°angle.
- verify that for large grout placements, metal bands or straps have been placed under the base plates to facilitate moving grout into difficult areas. These should only be used if allowed by the grout manufacturer.
- verify that grouting only proceeds from the grout placing side of the form to prevent the entrapment of air pockets

- verify that all required testing is done in accordance with specifications. Generally, nonshrink grout cubes should be made, cured and tested in accordance with ASTM C1107 and should be recorded on a form similar to Attachment **M**.
- verify that the grout is cured in accordance with manufacturer's recommendations and/or specifications. **Page 2 of the Grout Pour Card or equivalent document shall be completed.**

Structural Steel Inspection

Structural steel, including high strength bolts, washers and nuts shall be received, stored and handled in accordance with procedure QC-D-01: Receipt, Storage and Handling of Products. Structural steel shall be stored in accordance with Item #1 under Storage Requirements while nuts, bolts and washers shall be stored in accordance with Item #2 of QC-D-01. **As a part of receipt inspection**, individual members shall be randomly checked against the fabrication drawings via the piece number for compliance. Any nonconforming items shall be processed in accordance with procedure QC-H-01.

Erection

Structural steel erection, high strength bolting and welding processes shall be in accordance with job site specifications, procedures, and drawings; the AISC Manual of Steel Construction; AWS D1.1 Structural Welding Code; **OSHA Steel Erection Standard – 29 CFR Part 1926 Subpart R** and procedure QC-G-04 Welding Inspection. Daily activities should be recorded **in the Daily Activity Log in the Southern Projects database,** on a Daily Inspection Report or **in a** log book.

Per OSHA requirements, prior to erecting steel, the steel erector shall be provided with documentation that shows that the concrete in the footings, piers and walls and the mortar in masonry piers and walls has attained either 75 percent of the intended minimum compressive design strength or sufficient strength to support the loads imposed during steel erection. In addition, the steel erector shall receive written notification of any repairs, replacements and modifications to the anchor bolts.

During erection, the contractor shall verify "in story" and overall plumbness per AISC and job site requirements.

Key Inspection Attributes

Following are minimum key inspection items that should be checked and/or verified as part of structural steel erection activities:

- structural members are assembled per the drawings
- unless stated otherwise on job site specifications and/or drawings, structural steel shall be erected in accordance with AISC specifications

- o fit up bolts and drift pins shall not be used to bring out of tolerance fabricated members and parts into place.
- o drift pins shall not be driven with such force as to damage adjacent metal
- o burning of bolt holes shall not be allowed
- o no cutting of structural steel will be permitted without approval of SCG Engineering and Construction Services or its designee
- o high strength nuts and bolts shall be discarded if the nut cannot be turned freely by hand the entire threaded length of the bolt
- o visual welding inspection shall be performed in accordance with the AWS Structural Welding Code, job site specifications and procedure QC-G-04 Welding Inspection
- o high strength bolting shall be performed in accordance with the AISC Specification for Structural Joints, job site specifications and as noted below

High Strength Bolting

High strength bolting activities may be recorded on a report similar to Attachment **P**. This report should be modified based on the particular bolting operation being used (turn-of-nut, direct tension indicator, calibrated wrench, etc.).

As specified in the AISC Manual of Steel Construction, before bolting operations begin, a tension measuring device (i.e. Skidmore Wilhelm) shall be used to verify minimum bolt tension for each type of bolt assembly. AISC requires that a minimum of three bolts be tested for each type bolt assembly to insure that the anticipated bolting process will develop a tension not less than 5% above the requirements of AISC Specifications for Structural Joints Table 4. The results of this verification testing should be recorded on a form similar to Attachment **Q**.

If job site specifications require the use of a torque wrench for verifying bolt tension **or if the arbitration method as outlined in the Specification for Structural Joints Using ASTM A325 or A490 bolts is used**, the resulting "job inspection or **arbitration** torque" shall be determined in accordance with AISC requirements using a representative sample of five bolts from the diameter, length and grade of the bolts used in the actual work. The resulting job inspection/**arbitration** torque shall be based on the average of three values after rejecting the high and low values. Attachment **R** may be used for determining this value. **If this technique is used,** unless stated otherwise in job site specifications, 100% of bolted connections shall be inspected visually and 10% but not less than 2 bolts per connection shall be checked to verify the required minimum tension.

In addition to using a torque wrench to verify bolt tension, tightened bolts can be inspected by:

(1) examining the surfaces of the nuts to determine whether each unit has been impacted. The impact wrench usually burnishes or sometimes distorts the edge or flats of the nut of an A325 bolt. However, heat-treated nuts used on some high strength structural bolts are hard and therefore are unlikely to be distorted.

(2) **for the turn of nut method**, observing "match marks" placed on the bolt end and the nut by the bolting operator before final tightening but after "snug tight". After final tightening, verify that the difference between the marks is in accordance with specifications.

(3) for direct tension indicator washers, verifying that the inspection gauge will not enter the gap remaining after the tensioning process has been completed at least 50% of the time.

(4) verifying at least full bolt thread engagement after tensioning; some job specifications may require additional thread engagement beyond full

Documentation
All completed forms and reports should be filed and maintained throughout the construction process. At the completion of the project, these records shall be processed in accordance with procedure QC-I-01 Control of Quality Records.

Coatings Inspection

Paints and coatings shall be received, stored and handled in accordance with procedure QC-D-01: Receipt, Storage and Handling of Products. Paints and coatings shall be stored in accordance with Item #3 "Storage Requirements" of QC–D-01. A Materials Safety Data Sheet shall be on site for each type of coatings received and should be reviewed by the appropriate personnel before the start of work.

Paint and/or coatings shall be applied in accordance with job site specifications, procedures, drawings and manufacturer's recommendations. Daily activities should be recorded **in the Southern Projects database,** on a Daily Inspection Report or **in a** log book.

Key Inspection Attributes
Following are minimum key inspection items that should be checked and/or verified as part of paints and coatings application activities:

- Ambient Conditions – check at the beginning of work and every 4 hours thereafter or more often if conditions change
  - air temperature
  - wet bulb temperature
  - relative humidity
  - dew point
  - wind velocity
  - surface temperature of material being coated
- Surface Preparation

- surface has been cleaned per specification requirements (SSPC-SP6, SSPC-SP10, etc.)

- Equipment, Material and Application Checklist
  - MSDS has been received and reviewed by appropriate personnel
  - application equipment clean and in good working condition
  - coatings being mixed per manufacturer's recommendation
  - coatings being applied per manufacturer's recommendation using good technique to prevent overspraying, uneven thickness, etc.
  - equipment properly and thoroughly cleaned after use
- Wet Film Thickness Readings
  - numerous wet film thickness readings should be taken to gauge technique and ultimate dry film thickness
- Dry Film Thickness Readings
  - dry film thickness readings should be taken to verify compliance to specifications (take minimum of 5 measurements spaced evenly over every 100 square feet)
- Holiday Detection
  - testing to detect holidays (pinholes), if required by specifications
  - repair of holidays if detected

Documentation
Results of coatings inspections may be recorded on a form similar to Attachment **S**. All completed forms and reports should be filed and maintained throughout the construction process. At the completion of the project, these records shall be processed in accordance with procedure QC-I-01 Control of Quality Records.

Ductwork Inspection and Insulation

Ductwork components shall be received, stored and handled in accordance with procedure QC-D-01: Receipt, Storage and Handling of Products. Ductwork components shall be stored in accordance with Item #1 "Storage Requirements" of QC-D-01.

Ductwork components shall be assembled in accordance with job site specifications, procedures, drawings and manufacturer's recommendations. Daily activities should be recorded in the Southern Projects database, on a Daily Inspection Report or in a log book.

Key Inspection Attributes

Following are minimum key inspection items that should be checked and/or verified as part of ductwork assembly activities:

- **Duct assembled in proper sequence per drawings and specifications**
- **Duct erected plumb and square per specification requirements**
- **All stitch welds completed per drawings and specifications and inspected**

- **All seal welds completed per drawings and specifications and inspected**
- **Expansion joints erected and installed per drawings and specifications**
- **Duct assembly free of dirt and trash**
- **Access doors installed per drawings and specifications and closed and tight**
- **Ductwork sealed as required**
- **Ductwork tested as required**
- **Lagging and insulation installed per drawings and specifications**
    - **verify thickness and type of insulation required**
    - **name plates, code stamps, etc. are to be left exposed**
    - **stagger joints on double layer insulation**
    - **insulation must be kept dry until properly weatherproofed**

Documentation

All documentation of ductwork inspections shall be maintained and updated until such time that the system can be released to plant operations personnel. At that time, all documentation shall be assembled as part of the appropriate turn over package and processed in accordance with procedure QC-I-01: Control of Quality Records and administrative procedure 3G: Processing Startup Packages.

CAISSON INSPECTION REPORT

Caisson No.	
Caisson Location	

PLANT BOWEN SCR PROJECT — **SCGEM ENGINEERING AND CONSTRUCTION SERVICES**

Nominal Diameter	1	
Top Elevation	2	
Ground Surface Elevation	3	
Design Bearing Pressure / Approved Final Bearing Pressure	4	
Date Excavation Begun / Completed	5	
Blasting — Number and Size of Charge	6	
Blasting — Nearest Open Hole	7	
Blasting — Nearest Green Concrete	8	
Blasting — Elevation of Blasting	9	
Blasting — Charge Size per Delay	10	
Final Bearing Elevation	11	
Cleanout Approval	12	
Ratio of Concrete Placed to Theoretical Volume	13	

Caisson Contractor: Grouting Contractor:

Drilling Equipment Used:

Drilling Procedures:

Water Problems Encountered? ☐ YES ☐ NO

If YES, describe how they were handled:

Leveling of bottom of hole required? ☐ YES ☐ NO

If YES, then: Quantity of rock removed:

Depth of rock removed:

How was leveling accomplished?

Remarks/Comments

Caisson Data:		Design / Field	Approval	Date
Shaft Diameter	14			
Vertical Steel				
Number	15			
Size	16			
Length	17			
Hoops				
Number	18			
Size	19			
Diameter	20			
Concrete Volume	21			
Concrete Strength	22			

Caisson Data:		Design / Field	Approval	Date
Alignment				
North - South	23			
East - West	24			
Plumbness	25			
Dowels				
Number	26			
Size	27			
Total Length	28			
Length in Concrete	29			
Length in Rock	30			
Positioning Scheme	31			

INSPECTOR: _____ COMPLETION DATE: _____

PRINT NAME: _____

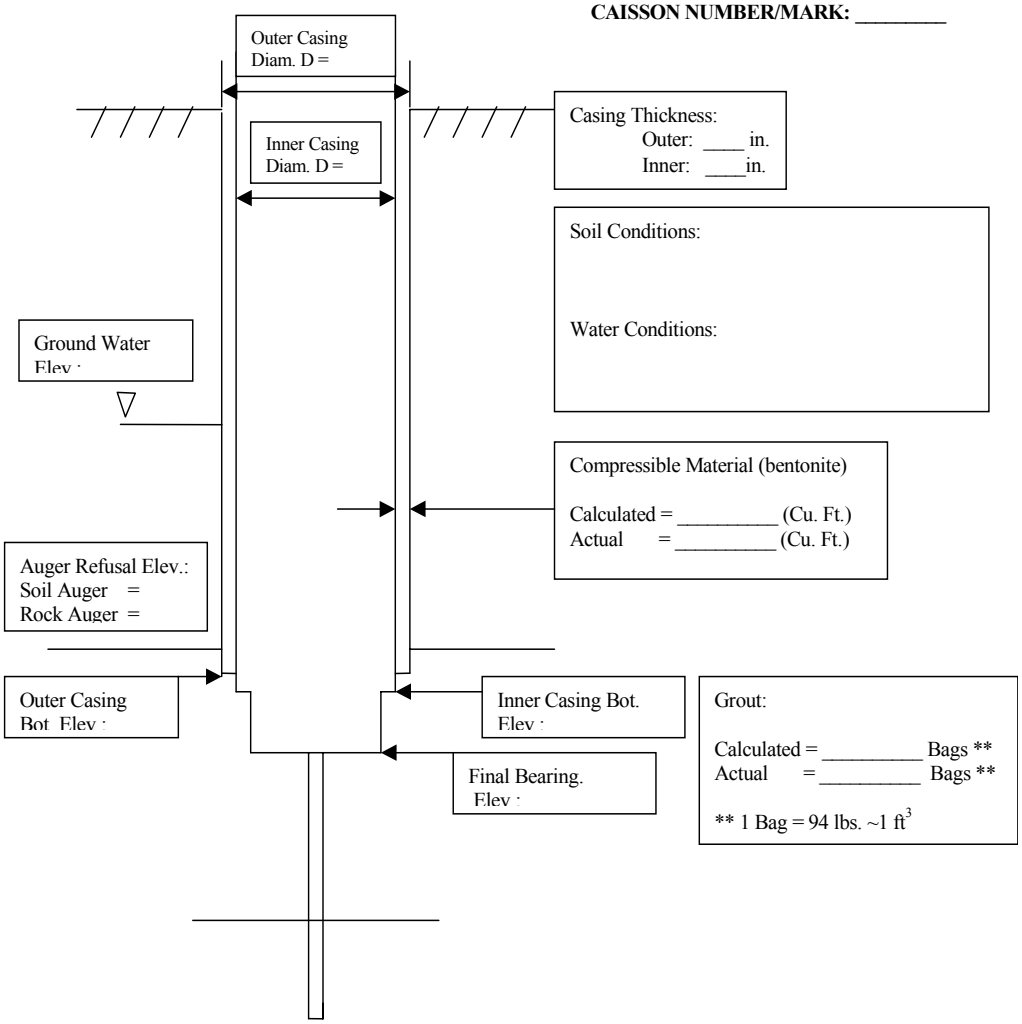
Attachment A
Page 1 of 2

Reference Elevation: _____
Ground Elevation: _____
Outer Casing Top Elev.: _____
Inner Casing Top Elev.: _____

CAISSON INSPECTION REPORT

BOWEN SCR PROJECT

CAISSON NUMBER/MARK: _____



TEST HOLE # _____ Depth: _____ ft. Voids/Seams: Total No. Top 1.5D _____ Total Thickness _____in Total No. Bot. 0.5D _____ Total Thickness _____in Watertightness No Flow _____ Flow (gpm)	TEST HOLE # _____ Depth: _____ ft. Voids/Seams: Total No. Top 1.5D _____ Total Thickness _____in Total No. Bot. 0.5D _____ Total Thickness _____in Watertightness No Flow _____ Flow (gpm)	TEST HOLE # _____ Depth: _____ ft. Voids/Seams: Total No. Top 1.5D _____ Total Thickness _____in Total No. Bot. 0.5D_____ Total Thickness _____in Watertightness No Flow _____ Flow (gpm)

Attachment A
Page 2 of 2

PILING DRIVING RECORD

PROJECT:	**CONTRACTOR:**
PILE NUMBER:	**DATE:**
FOUNDATION TYPE:	**LOCATION:**

HAMMER	**MAKE AND MODEL**	**RATED ENERGY**	**PILE**	**TYPE PILE**		
	DRIVING RIG NO.	**RAM WEIGHT**		**TIP DIAMETER**	**BUTT DIAMETER**	
	OPERATING PRESSURE	**AVG. BLOWS/MIN.**		**LENGTH DRIVEN**	**PILE WEIGHT**	

FURNISH LENGTH	**ELEVATION OF CUTOFF**	**ELEVATION OF TIP**	**LENGTH CUTOFF TO TIP**

FT.	BLOWS PER FOOT	FT.	BLOWS PER FOOT	FT.	BLOWS PER FOOT	FT.	BLOWS PER FOOT	FT.	BLOWS PER FOOT
1		21		41		61		81	
2		22		42		62		82	
3		23		43		63		83	
4		24		44		64		84	
5		25		45		65		85	
6		26		46		66		86	
7		27		47		67		87	
8		28		48		68		88	
9		29		49		69		89	
10		30		50		70		90	
11		31		51		71		91	
12		32		52		72		92	
13		33		53		73		93	
14		34		54		74		94	
15		35		55		75		95	
16		36		56		76		96	
17		37		57		77		97	
18		38		58		78		98	
19		39		59		79		99	
20		40		60		80		100	

Comments: _____

INSPECTOR: _____ DATE: _____

E&CS: _____ DATE: _____

ATTACHMENT B

PILING DRIVING RECORD

PRECAST PRESTRESSED CONCRETE PILE

PROJECT:	**CONTRACTOR:**
PILE NUMBER:	**DATE:**
FOUNDATION TYPE:	**LOCATION:**

HAMMER	**MAKE AND MODEL**	**RATED ENERGY**	**PILE**	**TYPE PILE**	
	DRIVING RIG NO.	**RAM WEIGHT**		**LENGTH**	**PENETRATION LENGTH**
	STROKE	**AVG. BLOWS/MIN.**		**CUTOFF LENGTH**	**TENSION BAR EMBEDMENT LENGTH**

PILE SET ON POINT? **YES NO**	**PILE PLUMB?** **YES NO**	**PILE ORIENTATION CORRECT?** **YES NO**

FT.	BLOWS PER FOOT	FT.	BLOWS PER FOOT	FT.	BLOWS PER FOOT		BLOWS PER MINUTE		
1		21		41					
2		22		42					
3		23		43					
4		24		44					
5		25		45					
6		26		46					
7		27		47					
8		28		48					
9		29		49					
10		30		50					
11		31		51					
12		32		52					
13		33		53					
14		34		54					
15		35		55					
16		36		56					
17		37		57					
18		38		58					
19		39		59					
20		40		60					

Comments: _____

INSPECTOR: _____ DATE: _____

E&CS : _____ DATE: _____

ATTACHMENT C

Daily Log

SOUTHERN COMPANY
Energy to Serve Your World®

Plant:	Project:	
Today's Date:	Day of Week:	Ground Conditions (dry, damp, wet, frozen):

Equipment Used Today:

Idle Equipment Today:

Work Performed:

Craft/Supervision observed in work areas:

Difficulties with Contractor or Representative:

Unforeseen Development on Job (Describe conditions, action taken, person contacted, recommended actions):

Other Comments, Conversation Notes, or Pertinent Facts:

ATTACHMENT D

Site Coordinator:

Moisture Content of Soils

Direct Heat Method (ASTM D4959)

Date: _____ Sample Location: _____

Technician: _____ Sample Description: _____

Test Number	1	2	3	4	5	6
Scale Number						
Wet Weight of Sample						
Dry Weight of Sample						
Weight of Moisture						
Percent Moisture						

$$\% \text{ Moisture} = \frac{\text{Wt. Of Moisture}}{\text{Wt. Of Dry Soil*}} \times 100$$

* Wt. Of Dry Soil = Dry Wt. Of Sample

Direct Heat Methods shall be periodically compared to the Oven Dry Method (ASTM D2216) to confirm validity of results.

Attachment E

Particle Size Analysis Of Soil
WASH 200 AND SIEVE ANALYSIS

Date: _____ Sample Location: _____

Technician: _____ Sample Description: _____

Wash 200 (ASTM D1140)

Oven Dry Weight Before Wash (grams): _____ Oven Dry Weight After Wash (grams): _____ % Passing 200 Sieve: _____

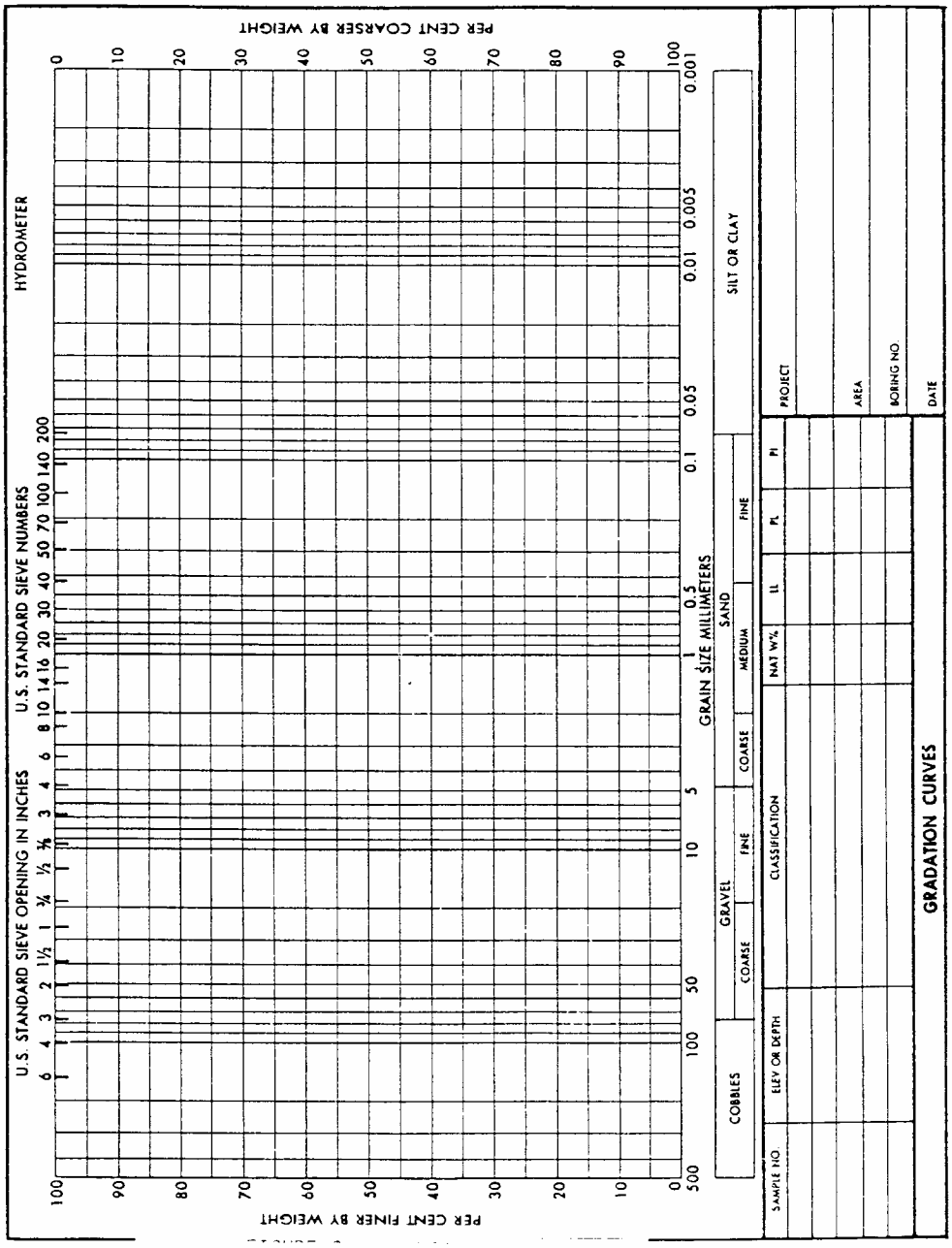
Sieve Analysis (ASTM D422)

Oven Dry Weight Of Sample Before Sieving (grams): _____

Sieve Size	Cum. Wt. Retained	% Total Retained	% Total Passing	Specs.
3''				
1½''				
1				
¾				
½				
⅜				
No. 4				
8				
16				
30				
40				
50				
100				
200				
Pan				
Total				

$$\% \text{ Error} = \frac{(\text{Wt. Of Sample Before Sieving}) - (\text{Wt. Of Sample After Sieving})}{\text{Wt. Of Sample Before Sieving}} \times 100$$

Attachment F
Page 1 of 2



Attachment F
Page 2 of 2

Atterberg Limits
LIQUID LIMIT AND PLASTIC LIMIT

Date: _____ Sample Location: _____

Technician: _____ Sample Description: _____

	Liquid Limit (ASTM D423)				Plastic Limit (ASTM D424)			
Trial Number	1	2	3	4	1	2	3	4
Scale Number								
Drops								
Tare Number								
Wet Wt. + Tare (grams)								
Dry Wt. + Tare (grams)								
Tare Wt. (grams)								
Wt. Moisture (grams)								
Wt. Dry Soil (grams)								
% Moisture								

Liquid Limit (LL): _____

Plastic Limit (PL): _____

Plasticity Index (PI) = LL – PL = _____

Attachment G

Moisture Density Relations of Soils
PROCTOR DATA SHEET

ASTM Designation and Method: _____

Proctor Identification: _____

Date: _____ Sample Description: _____

Technician: _____

Weight Mold: _____ lbs. Mold Volume Factor ($\frac{1}{\text{Volume}}$): _____

Pound Scale Used: # _____ Gram Scale Used: # _____

Sample Location: _____

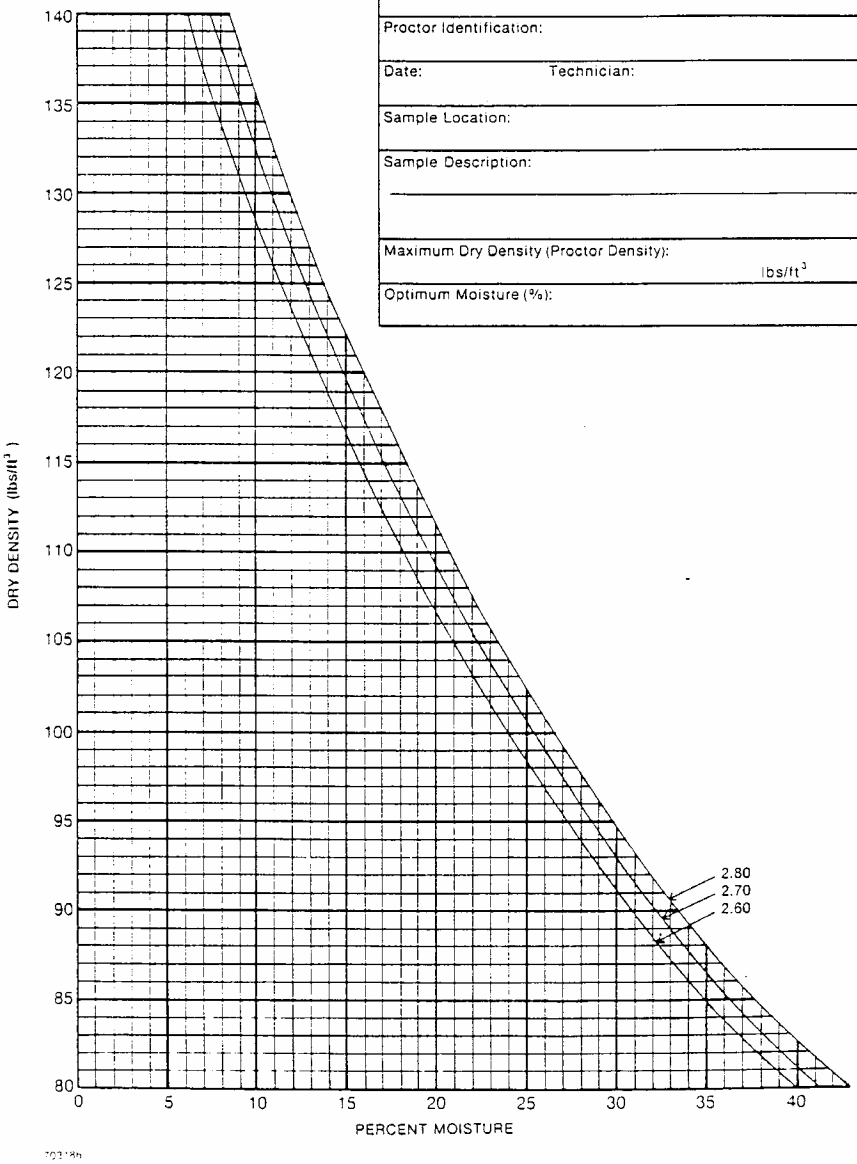
		1	2	3	4	5	6	7
	Water Added (ml)							
Wet Density Determination	Wt. Soil and Mold (lbs.)							
	Weight Soil (lbs.)							
	Wet Density (lbs/ft^3)							
Moisture Content Determination	Tare Number							
	Wet Weight Sample + Tare (grams)							
	Dry Weight Sample + Tare (grams)							
	Tare Weight (grams)							
	Weight of Moisture (grams)							
	Weight of Dry Soil (grams)							
	Percent Moisture							
	Dry Density (lbs/ft^3)							

Maximum Dry Density (Proctor Density): _____ (lbs/ft^3) Optimum Moisture (%): _____

Attachment H
Page 1 of 2

Moisture Density Relations of Soils
COMPACTION CURVE SHEET

ASTM Designation and Method:
Proctor Identification:
Date: Technician:
Sample Location:
Sample Description:
Maximum Dry Density (Proctor Density): lbs/ft^3
Optimum Moisture (%):



Attachment H
Page 2 of 2

Sand Cone Method of Field Testing (ASTM D1556)
FIELD DENSITY DETERMINATION

Date_____ Test Area _____

Inspector _____

Volume Determination	North Coordinate or Station (Mark out items not applicable)						
	East Coordinate or Offset (Mark out items not applicable)						
	Elevation						
	Test Number						
	Sand Jar Number						
	Scale Number						
	Initial Wt. (Jar and Sand) (lbs.)						
	Final Wt. (Jar and Sand) (lbs.)						
	Weight Sand Used (lbs.)						
	Weight Sand in Cone and Plate (lbs.)						
	Weight Sand in Hole (lbs.)						
	Bulk Density of Sand (lbs./ft.^{3})						
	Volume of Hole (ft.^{3})						
Wet Density Determination	Scale Number						
	Container Number						
	Weight Soil and Container (lbs.)						
	Weight of Container (lbs.)						
	Weight of Soil (lbs.)						
	Wet Density (lbs./ft.^{3})						
Moisture Content Determination	Tare Number						
	Scale Number						
	Wet Weight Moisture Sample + Tare (grams)						
	Dry Weight Moisture Sample + Tare (grams)						
	Tare Weight (grams)						
	Weight of Moisture (grams)						
	Weight of Dry Soil (grams)						
	Percent Moisture						
Dry Density and Compaction Determination	Dry Density (lbs./ft.^{3})						
	Proctor Number						
	Proctor Density (lbs./ft.^{3})						
	Optimum Moisture						
	% Compaction Required						
	% Compaction Obtained						

Comments: _____

Attachment I

Drive-Cylinder (Shelby Tube) Method of Field Testing (ASTM D2937)
FIELD DENSITY DETERMINATION

Date _____ Test Area _____

Inspector _____

	North Coordinate or Station (Mark out items not applicable)						
	East Coordinate or Offset (Mark out items not applicalbe)						
	Elevation						
	Test Number						
Wet Density Determination	Scale Number						
	Shelby Tube Identification						
	Weight Soil and Shelby Tube (lbs.)						
	Weight of Shelby Tube (lbs.)						
	Weight of Soil (lbs.)						
	Mold Volume Factor						
	Wet Density (lbs./ft.^{3})						
Moisture Content Determination	Tare Number						
	Scale Number						
	Wet Weight Moisture Sample + Tare (grams)						
	Dry Weight Moisture Sample + Tare (grams)						
	Tare Weight (grams)						
	Weight of Moisture (grams)						
	Weight of Dry Soil (grams)						
	Percent Moisture						
Dry Density and Compaction Determination	Dry Density (lbs./ft.^{3})						
	Proctor Number						
	Proctor Density (lbs./ft^3)						
	Optimum Moisture						
	% Compaction Required						
	% Compaction Obtained						

Comments: _____

Attachment J

TROXLER MODEL 3411 DENSITY MEASUREMENTS

AREA _____ DATE _____

STANDARD COUNTS		
Time	Density	Moisture

Test Number	1	2	3	4	5	6	7	8	9	10
North Coordinate										
East Coordinate										
Elevation										
"K" Factor										
Depth										
Wet Density (PCF)										
Moisture (PCF)										
Dry Density (PCF)										
% Moisture										
Proctor Number										
Proctor Density										
Optimum Moisture										
% Compaction Required										
% Compaction Obtained										

Remarks _____

3411 TROXLER SERIAL #: _____ Inspector _____

Attachment K

CONCRETE POUR CARD

SCGEM E&CS CONSTRUCTION SERVICES
PROJECT: _____

POUR _____ MIX DESIGN _____ CONTRACTOR _____

Item	Craft Representative	Date Time	Survey/QC Representative	Date Time	SCGEM Representative	Date Time
Foundation Prep.						
Drains						
Reinforcing Steel						
Cadweld						
Mechanical						
Electrical						
Embed						
Forms (Including Line and Grade)						
Waterstop						
Clean-Out Before Placement						
Construction Joint						
Safety and Access						

DESIGNATED READY (SCGEM) _____ DATE _____ TIME _____

PLACEMENT STARTED DATE _____ TIME _____

POUR COMPLETED DATE _____ TIME _____

PLACEMENT INSPECTOR _____ ANTICIPATED CUBIC YARDS_____

APPROXIMATE YARDS PLACED _____

COMMENTS/REMARKS _____

_____

_____

_____

_____ _____

_____ _____

ATTACHMENT L
PAGE 1 0F 2

CONCRETE POUR CARD

(CONTINUED)

POUR NUMBER:	**DATE POUR COMPLETED:** _____ **TIME POUR COMPLETED:** _____
TYPE CURE REQUIRED:	**DATE CURE STARTED:** _____ **TIME CURE STARTED:** _____

CURE RECORD

DATE	WEATHER	AMBIENT TEMP.	CURE CONDITION	CONCRETE SURFACE TEMP	VERIFIED BY:

	Yes	No	
Concrete Repairs Needed?	☐	☐	**Explain Corrective Action Taken:**
Finish Required?	☐	☐	**Type Finish Required:**

ALL CONCRETE POST PLACEMENT ACTIVITIES HAVE BEEN COMPLETED AND INSPECTED AND THIS PLACEMENT IS HEREBY RELEASED FOR FURTHER USE.

CONTRACTOR: _____ DATE: _____

ATTACHMENT L
PAGE 2 OF 2

Set ID: _____

Client: **SCGEM Engineering and Construction Services**
Project: **Plant Bowen SCR Project**
Contractor: _____
Pour Number: _____

WORK REQUEST INFO

Date Requested		Time Requested	
Date Called		Time Called	
Type Work			
No. Of Sets		No. Of Cyls	
Requested By			

TICKET INFORMATION

Time Batched		Time Sampled	
Truck No		Ticket No.	
Concrete Plant			
Spec Comp Str		PSI At	Days
Mix ID		Mix Type	
Truck Revolutions:			

FIELD DATA

Date Sampled/Rec'd			
Conc. Supplier			
Sampled By			
No Cyls Molded			

Load Size		(Cubic Yards)	
Sampled at		YD^3 of	Total YD^3
Water Added On-site		Gallons	
On-Site H2O Authorized By			

Location Of Concrete Placement: _____

Curing Facilities: (Field/ Lab)

Remarks: _____

	Result	MIX ID Specified
Air Temp		HI: Low:
Concrete Temp		HI: Low:
Slump		HI: Low :

	Result	MIX ID Specified
Air Content (%)		HI: Low:
Plastic Unit Weight (pcf)		HI: Low:

Concrete Inspector Performing Tests: _____ **Date:** _____
Print Name: _____

Date REC	Cyl No	Test Date	Age (Days)	Curing	Load (Lbs.)	COMP Strength	Type Fracture	Comment	Inspector Initials

Type Of CAP Sulfur: _____ PAQ: _____ Other: _____

Note: Cylinders have nominal diameter of 6.00 inches unless otherwise indicated.

Concrete Lab Supervisor: _____ **Date:** _____
Print Name: _____

Note: A copy of this test report will be maintained on site until final breaks are completed. At that time the completed signed original will replace the copy in the job site files.

Attachment M

GROUT POUR CARD

MCINTOSH CC PROJECT **SCGEM E&CS CONSTRUCTION SERVICES**

UNIT NO: _____ **PROJECT NO: _____**

EQUIPMENT NO:	**GROUT POUR NO:**
DRAWING NO:	**SPEC. NO:**

Piece Mark, Equip. No., or Dwg. No.	Item Description	Type of Grout	Grouting Specification Requirements

CHECKLIST:	SAT	N/A		SAT	N/A
Concrete Cured	☐	☐	Anchor Bolts	☐	☐
Surface Prep'd	☐	☐	Leveling Screws	☐	☐
Surface Wet (24 hrs)	☐	☐	Equip. Level	☐	☐
Formwork	☐	☐	Rough Alignment	☐	☐
Grout Shelf Life	☐	☐	Pipe Connections	☐	☐
Ambient Temp.	☐	☐	Ice Water Available	☐	☐
Surface Temp.	☐	☐			

REMARKS/EXCEPTIONS:

DESIGNATED READY

Civil: _____ Date: _____

E and I: _____ Date: _____

Mech/PPG: _____ Date: _____

AUTHORIZATION IS HEREBY ISSUED TO PROCEED WITH GROUTING WORK IN ACCORDANCE WITH APPLICABLE DRAWINGS AND SPECIFICATIONS FOR THE ITEMS LISTED ABOVE.

Quality Control: _____ Date: _____

GROUT POUR CARD

(continued)

No. of Grout Cubes Taken	Cube Identification Numbers								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

CURING CHECKLIST	**SAT**	**N/A**	Grouting Specification Requirements
Initial Curing	☐	☐	
Final Curing	☐	☐	
Curing Maintained As Required	☐	☐	

	Yes	**No**	Comments
Any indication of cracking?	☐	☐	
Corrective Action Needed?	☐	☐	

THIS GROUT PLACEMENT HAS MET ALL SPECIFICATION REQUIREMENTS AND IS HEREBY RELEASED FOR FURTHER USE AND/OR LOADING

Quality Control: _____ Date: _____

Attachment N
Page 2 of 2

GROUT INSPECTION CHECKLIST

ITEM DESCRIPTION	YES	NO	N/A
PREPLACMENT INSPECTION			
1) Has existing concrete been properly cleaned, roughened and saturated with water for 24 hours prior to placement?			
2) Verify that the proper equipment is available, clean and in good working order.			
3) Verify that the formwork is properly constructed.			
Headbox Needed			
Forms water tight			
4) Verify correct grout for the placement, including shelf life			
5) Check ambient and surface temperatures			
6) Verify that ice water or hot water is available, as necessary, to regulate the mixed grout temperature.			
7) Verify that provisions have been made for the proper preparation and storage of grout cubes.			
PLACEMENT INSPECTION			
1) Verify that the mixing crew has a good understanding of the mixing and placing process and knows the maximum amount of mixing water that can be added to the grout.			
2) Verify that Page 1 of the Grout Pour Card has been completed and signed.			
3) If required, verify the use of straps or bands prior to the start of placement			
4) Insure that grouting only proceeds from the grout placing side of the form to prevent the entrappment of air pockets.			
5) Monitor the temperature and flow of the grout to prevent the formation of cold joints.			
6) Insure that grout is visible at all exit points before completing the placement.			
7) Verify that the required number of grout cubes have been properly made and stored per ASTM C 1107 and/or ASTM C 109 as required by specifications.			
8) Verify that the proper sequential numbers for the cubes are added to the Grout Pour Card			
POSTPLACEMENT (CURING) INSPECTION			
1) Verify that initial curing has been implemented per specification requirement: i.e. wet cure with damp rags for 24 hours			
2) Verify that forms are removed within the specified time frames to facilitiate curing but prevent damage to the grout.			
3) Verify that final curing has been implemented: continous wet cure or the use of curing compound.			
4) Inspect for cracking; if found, be sure to note on the Grout Pour Card and to follow up with corrective action.			
5) Insure the grout placement is not subjected to loading or other use until it has reached sufficient compressive strength.			
6) Insure that Page 2 of the Grout Pour Card has been completed and signed			

Attachment O

Plant McIntosh CC Project

Inspection of Bolted Connections - Load Indicator Washers

Unit:

Location:

Drawings:

Maximum Allowable Gap:

Connection Description	Number of Bolts Inspected	Inspection (Pass/Fail)	Comments/Results

Signature

Date

Attachment P

Project Name: _____

Verification of Required Minimum Bolt Tension

Skidmore Number:

Calibration Date:

Date of Test:

Bolt Type:

Bolt Diameter and Length:

Test Results:

Bolts	Tension	Average 3 Bolts*
1		
2		
3		

*** Results must be 5% greater than results in Table 4 of AISC Specification for Structural Joints Using ASTM A325 or A490 Bolts**

Remarks:

Signature _____ Date _____

Attachment Q

Project: _____

Determination of Job Inspection/Arbitration Torque

Skidmore Number:	
Calibration Date:	
Date of Test:	
Bolt Type:	
Bolt Diameter and Length:	
Torque Wrench Type and Serial Number:	

Test Results:

Bolts	Tension Readings*	Torque Readings	Average Torque**
1			
2			
3			
4			
5			

*** Per Table 4 of AISC Specification for Structural Joints**

**** Job inspection torque shall be the average of three values after rejecting the high and low values**

Remarks:

Signature _____ Date _____

Attachment R

Coatings Quality Control Checklist

Location of Work: _____ Date: _____

Contractor and Manpower: _____

Coatings Being Applied: _____

Ambient Conditions

Task – Check at beginning of work and every 4 hours thereafter	1	2	3	4	Specs.
1) Check and record air temperature					
2) Check and record wet bulb temperature					
3) Determine and record relative humidity					
4) Determine and record dew point					
5) Check and record wind velocity					
6) Check and record surface temperature of steel					

Surface Preparation

Task	Yes	No	N/A	Specs
1) Is the surface to be coated clean, free of excessive overspray and prepared per manufacturer's recommendations?				
2) Has the prime coat been "touched up" as necessary?				
3) Have initial readings of the prime coat DFT been taken to serve as a reference point for the final coat?				
4) Has blast profile readings been taken as required?				

Equipment, Material and Application Checklist

Task	YES	NO	N/A
1) Have the MSDS been received and reviewed by appropriate personnel?			
2) Is the coating being stored in a climate controlled environment per manufacturer's literature?			
3) Is the coatings application equipment clean and in good working order?			
4) Is the coating material being mixed per manufacturer's recommendations?			
5) Is the coating material being applied per manufacturer's recommendation, using good technique to insure proper application?			
6) List equipment being used:			

	1	2	3	Specs.
7) Wet Film Thickness Readings				

	Yes	No	N/A
8) Has the equipment been properly cleaned after use?			

Final Inspection

Task – take minimum of 5 measurements spaced evenly over every 100 square feet	1	2	3	4	5	Specs
1) Dry film thickness readings less prime coat DFT Prime Coat DFT: _____						
2) Type equipment used for DFT readings:						

	Yes	No	N/A
3) If holiday (pinhole) detection testing is performed, were pinholes detected?			
4) If holiday (pinholes) were detected, have they been repaired?			

Comments:

_____
_____
_____
_____
_____

Signature: _____ Date: _____

Attachment S
Page 2 of 2

SCGEM Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – G – 02)

Electrical Inspection

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	7/7/00
0	Issued for Construction	*MJP*	*DMC*	*RWM*	7/26/00
1	Department name change; editorial changes and clarifications	*RHR, Jr.*	*PRM*	*JCH*	12/10/02
2	Incorporate Best Practices by Electrical QC Review Committee: J. Cannon, J. Goddard, R. Page, D. Webb	*RHR, Jr.*	*JBF*	*A. Baker*	8/9/04

QC – G – 02
Electrical Inspection

Purpose

This procedure establishes guidelines for the construction **and** installation inspection of electrical components at SCGEM Engineering and Construction Services **(E&CS)** construction projects.

Scope

Electrical components covered under this procedure shall include, but not limited to, grounding systems, embedded items, raceway and cable tray systems, cable installation and termination, and electrical equipment. The Turbine Generator and plant substations are not included in this procedure. In lieu of manufacturer's recommendations and specifications, the guidelines in this procedure shall be followed. This procedure is an integral part of the SCGEM **E&CS** Construction Services construction Quality Assurance Program.

Responsibility

It is the responsibility of the contractors employed by SCGEM **E&CS** Construction Services to ensure that electrical equipment is received, stored, maintained, handled and installed in a manner that will ensure the quality of equipment.

SCGEM **E&CS** Construction Services will perform whatever inspections are deemed necessary to ensure the quality of items being installed has been maintained.

The contractor or SCGEM employee or designee will complete the Electrical Inspection Checklist(s) as required.

The contractor, SCGEM employee or designee is responsible for completing the required documentation for this procedure. Any deviations will be reported in accordance with procedure QC- H-01, Nonconformance Report and QC-H-02, Hold Tag Procedure.

The contractors and SCGEM are responsible for coordinating work activities with other disciplines involved in electrical discipline installations.

The contractor and SCGEM will ensure all deficiencies have been resolved.

References

National Fire Protection Association – Section 70 – National Electrical Code
National Electrical Safety Code
American Electricians Handbook
ANSI , IEEE Standards
Illuminating Engineering Society of North America
E&CS Construction Services EH&S Policies and Procedures
Electrical inspection sample checklists and forms

General

- Tools that require calibration shall be calibrated in accordance with manufacturer recommendations.

- Equipment manufacturers will provide rigging, lifting and handling instructions for installing electrical equipment. The contractor, SCGEM or designee will verify that equipment is being supported, moved and set in place in such a manner as to provide maximum protection and safety for personnel and equipment.

- All work performed will be accomplished in a workmanlike standard, according to site specifications, drawings, manufacturer recommendations and **contract documents**.

Safety

Every employee has an individual responsibility for his or her personal safety and for the safety of others as well. Each employee should be knowledgeable of the safety rules applicable to his or her work. Employees must accept personal responsibility for cooperating and complying with all EH&S policies and procedures. Prior to beginning work, all employees shall review and have a thorough understanding of all applicable safety procedures contained in the E&CS Construction Services EH&S Policies and Procedures Manual.

Construction Systems

Receipt, Storage and Handling of Electrical Equipment
When electrical equipment has been received and placed in its designated area, all documentation and storage requirements will be performed as recommended

by the manufacturer. Some key inspection attributes include but are not limited to the following:

- Visual inspection of equipment received
  - Damage
  - Correct size, layout, type, labels, etc.
  - Loose wiring or components
  - Complete shipment
- Physical integrity check of equipment upon receipt and storage
- Electrical and mechanical integrity checks of rotating and non rotating equipment
- Maintenance requirements of equipment while in temporary or final storage location; including the use of temporary heaters and protection from the weather
- Documentation of all equipment received, stored or handled

Refer to Receipt, Storage and Handling of Products procedure QC-D-01, NonConformance Report Procedure QC-H-01 and Hold Tag Procedure QC-H-02 for additional information.

Electrical equipment that is stored at its final or permanent location without the benefit of temporary storage in a warehouse shall be subjected to the same requirements as outlined above and in procedure QC-D-01.

Grounding Systems

Grounding systems are provided for raceway and cable tray systems, electrical equipment and enclosures, building structures and other miscellaneous components. A properly installed grounding system will limit the damage to electrical equipment and personnel in case of fault currents or lightning strikes.

Inspection of grounding systems will verify the grounding systems are installed in accordance with the site specification and drawings. Some key inspection attributes include but are not limited to the following:

- Ground grid construction and installation, including conductors, ground rods and their connections
- Electrical and mechanical integrity of :
  - Site grounding system
  - Bonding systems for raceway, cable tray, equipment and building structures
  - Exothermic weld, mechanical or compression connections
- Ground system documentation

Electrical Embedded Items

An embedded item includes but is not limited to raceways, pull boxes, penetrations, grounding systems and electrical equipment foundation supports. Electrical embedded items will be installed, inspected and coordinated with the civil discipline before cable installation and equipment installation proceeds. Grounding systems checks will run concurrent with other ground testing requirements. Some key inspection attributes include but are not limited to the following:

- Embedded metallic and nonmetallic raceway systems construction checks including
  - Depth of burial
  - Raceways support systems
  - Bends and bending radius
  - Raceway identification
  - **Turn up location**
- General constructions specifications for electrical pull box / manhole construction, including OSHA Confined Space requirements
- Electrical and mechanical integrity checks of grounding / bonding system
- Visual inspection of embedded anchor bolts, equipment pads or grounding plates
- Embedded items documentation

Raceway and cable tray systems

Raceway and cable tray systems are the foundation for protecting electrical conductors from damage from initial construction to start-up testing to plant operations. Checks of these systems will verify the system is properly constructed, routed, grounded, supported and identified. As a minimum, verify the raceway and cable tray systems are installed in accordance with site drawings and specifications. Some key inspection attributes include but are not limited to the following:

- Metallic, nonmetallic, special raceways and cable tray systems installation checks including
  - Bends and bending radius requirements
  - Separation and clearance requirements
- Electrical and mechanical integrity checks of the grounding and bonding systems
- Mechanical integrity checks of raceway and cable tray support system(s) including
  - Raceways protection through penetrations
  - Raceways identification
- Raceway and cable tray documentation

Cable Installation

Power, control and telecommunication conductors are essential for any plant. Proper installation techniques will limit stress damage to conductors and reduce operational testing requirements of the conductor over its service life. **The contractor and Construction Services** will verify proper cable installation techniques are used, cable routing and supports are used and cable ends are prepared for termination. Some key inspection attributes include but are not limited to the following:

- Cable manufacturer specifications for:
  - Cable reel storage and field handling practices
  - Cable reel set up requirements
  - Cable pulling tension(s)
  - Bending radius and training radius
  - Approved cable pulling equipment / material (lubricants)
  - Special cable installation
  - Cable separation and support requirements
- Spare cable installation checks
- Spliced or coiled cable checks
- Cable installation techniques
- Cable testing after installation
- Cable installation documentation

Cable Termination

Power, control and telecommunication conductor terminations are used to provide continuity between the power supply and load. Proper terminations will reduce the voltage drop in a circuit and reduce the troubleshooting problems that may exist due to improper terminations. Cable termination checks will verify the proper hardware and techniques are used for terminating the various types of conductors, including armored cable and spliced conductors. As a minimum, verify the cables are terminated in accordance with site drawings, specifications and manufacturer recommendations.

High Potential testing and meggering shall be performed per job site specifications and cable/vendor manufacturer's recommendations. In lieu of these requirements and where appropriate, Power Generation procedure GEN-5031: High Potential Testing and Meggering shall be referenced. This procedure can be accessed via the following address:

http://powergeneration.southernco.com/plants/policy-procedures/gpc/ga_default.html

Some key inspection attributes include but are not limited to the following:

- Site listing of approved equipment and material used for cable termination
- Electrical and mechanical integrity checks of high and low voltage cable terminations

- Cable manufacturers specifications for cable splicing and special conductor terminations
- Visual inspection checks of high or low voltage terminations
- Cable termination documentation
- **Verify bolt torque requirements**

Equipment Installation

Equipment installation includes but is not limited to rotating equipment, enclosures, transformers and other associated equipment. Proper installation techniques are mandatory to ensure equipment functions as intended. Equipment checks will verify equipment location, orientation, configuration, supports and anchoring systems are in accordance with site specifications. Equipment and system testing will ensure equipment will function during start up and operational phases. As a minimum, a check will be made to verify all electrical equipment has been installed in accordance with site drawings, specifications and manufacturer recommendations. Some key inspection attributes include but are not limited to the following:

- Equipment manufacturer specifications for:
  - General equipment installation
  - Special equipment installation
  - Rigging, lifting and handling practices
  - Equipment stored in permanently installed location
- Electrical and mechanical integrity checks for rotating and non rotating equipment
- Equipment Installation documentation
- **Verify bolt torque**
- **Bus meggering or hot pot testing**
- **Internal wiring checks**

Lighting Systems

Lighting systems shall be designed and constructed in accordance with job site specifications to maintain a minimum illumination level in accordance with IESNA guidelines and the National Electrical Code. In addition, the design shall be based on minimum OSHA requirements for areas at typical industrial sites. Some key inspection attributes include but are not limited to the following:

- **verification of appropriate fixture for application per requirements**
- **verification of proper egress lighting**
- **verification of proper emergency lighting**
- **verification of lighting levels at specific points**
- **verification of lighting levels at work surfaces**
- **verification of required outdoor lighting**

- **inspection of lighting panel boards and contactors**
- **inspection of photocells to insure conformance to specifications**

Electrical Start up Check Points

The Startup process shall be performed in accordance with SCGEM E&CS Construction Services administrative procedure 3G – Processing Startup Packages.

Sample Forms and Checklists

Sample electrical inspection forms and checklists can be found on the E&CS Construction Services web page via the following address:

http://powergeneration.southernco.com/depts/engineering/procedures/fh/qc-procedures.pdf

The following forms are available for use on the web site as deemed appropriate by Construction Services site management:

Exhibit 1: Electrical Equipment Maintenance Checklist
Exhibit 2: Grounding Checklist
Exhibit 3: Electrical Embedded Items Checklist
Exhibit 4: Raceway/Cable Tray Installation Checklist
Exhibit 5: Electrical Cable Installation Checklist
Exhibit 6: Electrical Cable Termination Checklist
Exhibit 7: Electrical Equipment Installation Checklist
Exhibit 8: Electrical Motor Checklist
Exhibit 9: Electrical Equipment Verification Checklist
Exhibit 10: Hi-Pot Megger Data Sheet
Exhibit 11: Cable Test Report

Additional forms and checklists related to startup activities are available in the specific Startup manual for the project.

Document Control

All documentation of equipment inspections on SCGEM **E&CS** Construction Services construction projects shall be maintained and updated until such time that equipment has been released to plant operations personnel. At that time, all **appropriate** documentation shall be assembled as part of the appropriate turn

over package and processed in accordance with procedure QC-I-01 Control of Quality Records.

SCGEM Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – G – 03)

MECHANICAL INSPECTION

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	6/22/00
0	Issued for Construction	*JME*	*DMC*	*RWM*	7/12/00
1	Department name change; editorial changes and clarifications	*RHR, Jr.*	*JMS*	*JCH*	11/4/02
2	Incorporate Best Practices by the Mechanical QC Procedure Review Committee: R. Hall, R. Joyce, M. Mingus, K. Purcell	*RHR, Jr.*	*JBF*	*A. Baker*	8/9/04

QC – G – 03
Mechanical Inspection

Purpose

The purpose of this procedure is to outline the general guidelines necessary for the inspections of mechanical equipment, piping systems, piping support structures, instrumentation, valves, insulation and lagging, and hydrostatic testing at SCGEM Engineering and Construction Services **(E&CS)** construction projects.

Scope

Mechanical equipment covered under this procedure shall include, but not be limited to, motorized and non-motorized valves, pumps, compressors, tanks, heat exchangers, fired and unfired vessels, filter/demineralizer vessels, **in line components (expansion joints, etc.)** and other equipment that is within the mechanical inspection scope of work.

Generally, mechanical equipment, piping, piping support structures, **in line components**, instrumentation, valves, and insulation and lagging should be received, stored, maintained and installed in accordance with manufacturer's recommendations and mechanical engineering practices. In addition, specific requirements listed in project specifications and drawings shall be followed. In lieu of manufacturer's recommendations and specifications, the guidelines in this procedure should be followed.

This procedure is an integral part of the SCGEM **E&CS** Construction Services Quality Assurance Program and is intended for use on SCGEM **E&CS** Construction Services construction projects.

Responsibility

Generally, it will be the responsibility of the contractors employed by SCGEM **E&CS** Construction Services to ensure that mechanical equipment, piping, piping supports, **in line components**, instrumentation, valves, insulation and lagging are received, stored, maintained, handled, and installed in a manner that will ensure the quality of equipment received. SCGEM Engineering and Construction Services reserves the right to perform inspections and tests as deemed necessary to ensure that the quality of items is maintained.

Safety

Every employee has an individual responsibility for his or her personal safety and for the safety of others as well. Each employee should be knowledgeable of the safety rules applicable to his or her work. Employees must accept personal responsibility for cooperating and complying with all EH&S policies and procedures. Prior to beginning work, all employees shall review and have a thorough understanding of all applicable safety procedures contained in the E&CS Construction Services EH&S Policies and Procedures Manual.

Receipt, Storage and Handling of Mechanical Equipment

To ensure that all mechanical equipment is received, stored and handled per requirements, refer to Receipt, Storage and Handling of Products procedure QC – D – 01.

Nonconformance Reporting and Hold Tag Requirements

Refer to QC – H – 01 Nonconformance Report procedure and QC – H – 02 Hold Tag procedure for guidelines covering the initiation, follow-up and resolution of nonconforming items associated with mechanical equipment on SCGEM Engineering and Construction Services construction projects.

Mechanical Equipment Maintenance Requirements

When mechanical equipment has been received and all preliminary inspections have been performed, couplings for driven equipment that are not installed, (loosely attached to the equipment), should be removed, packaged, tagged and placed in storage until equipment installation prior to equipment turnover. Inspection personnel should complete a maintenance checklist **(refer to sample forms for an example)** and update same as needed until equipment has been released to plant operations personnel. Inspection personnel should refer to manufacturer's recommendations, governing codes (ie. ASME, ASTM, ANSI), mechanical engineering specifications, project specifications and drawings for:

- Type of storage required - refer to QC procedure QC-D-01 Receipt, Storage and Handling of Products for additional information on storage requirements

- Shaft Rotation – Motor shafts are rotated ¼ turn or 90 degrees and pump shafts are rotated per vendor requirements ensuring proper shaft lubrication and lubricant levels.

- Equipment Lubrication – Assess type and frequency of lubrication.

- Inert-Gas Blankets (Nitrogen Purge) – If equipment requires nitrogen purge**, refer to manufacturer's literature for required minimum test pressure. If manufacturer's recommendations are not available, 10 psig is considered an** accepted minimum to maintain positive pressure.

- Moisture Control – Proper methods of moisture control such as contact preservatives or vapor-proof barriers with dessicants and/or heating should be in place as required.

- Internal Heaters – Equipment having large motors are equipped with strip heaters that must be energized during storage.

- Protection of machined or bearing surfaces – Machined surfaces such as threads, **shafts**, key ways, bearings and coupling surfaces must be protected at all times; protection of these surfaces could include protective coatings such as waxed paper or polyethylene, and vendor supplied packaging used in shipping.

- Insulation checks (Meggering) – Periodic insulation checks are required by meggering performed by electricians. **Refer to QC procedure QC-G-02 Electrical Inspection for further information.**

- Protection of all external openings – All external openings should be protected by caps, plugs, etc. and rodent screens should be in place; motors should be protected from entry by rodents, insects, wind blown sand and debris.

- Frequency of inspections – Required follow up maintenance/inspection dates (usually every ninety days) should be assessed, and checklists should be updated as work is performed.

Mechanical Equipment Installation Requirements

When mechanical equipment is ready for installation, a checklist of inspection items should be followed **(refer to the list of sample forms for an example)**. As stated earlier, always refer to any manufacturer's recommendations, governing codes, mechanical engineering specifications, quality assurance procedures, and project specifications for the following items:

- Rigging and handling instructions for placing and installing equipment – ensure that equipment is being supported, moved and set in place in such a manner as to provide protection and safety for personnel and equipment.

- Review location, type and size of all anchor bolts per drawings and confirm that anchor bolts have been installed.

- Foundation plates, shimming, grouting data, etc. – all foundation/support inspections should have been completed and foundations/supports should be ready to receive equipment. After equipment has been placed on support structure, check that equipment has been shimmed, grouted etc. as required.

After equipment has been placed on its permanent foundation and all requirements for shimming and grouting have been met, prior to equipment start-up, mechanical inspection personnel should:

- Review all applicable equipment flushing, cleaning and dismantling instructions to be followed during start-up operations.

- Coupling instructions – Coupling alignment tolerances and measurements should be checked and adjustments made as needed so that no undue stresses are placed on the shafts, bearings, housings, and other components of joined equipment.

- Lubrication requirements – Assess equipment lubrication type, and/or frequency.

- All external openings must have remained covered and openings should be clear and clean.

- Preservatives on couplings – Check the type of coupling preservative and that the preservative is applied when required.

- Trim piping installation – Inspect skid mounted trim piping per drawings to ensure that all vendor supplied piping has been received and/or installed prior to installation of external piping or equipment.

- After the installation of external piping systems, check equipment alignment tolerances necessary to compensate for piping strain on equipment and ensure that adjustments are made as needed.

- Ensure type of mechanical packing required and that equipment has been packed.

Start-up Check Points

When mechanical equipment is ready for start-up, **the appropriate site specific startup manual shall be referenced. The specific checklists in the startup manual shall be completed and included in the turnover packages. Construction Services administrative procedure 3G – Processing Startup Packages shall be referenced for additional information.**

In general, verify that the following items have been completed. Refer to the sample forms for example checklists.

- Check that orifice plates are installed as required per drawings.

- Shaft rotation – Shafts on rotating equipment should be lubricated and shafts must be rotated as required.

- Final coupling alignment check – Ensure that couplings are still in alignment and

that tolerances are acceptable; also check that coupling preservatives are intact.

- Couplings are bolted together – Check that couplings are bolted together and joined equipment is not in an unacceptable strain.

- Lubrication – Ensure that equipment is still adequately lubricated.

Piping Systems Inspection

When inspecting piping systems the following items should be checked: **Refer to the sample forms for a sample checklist.**

- Check piping per installation drawings noting material, size, pipe schedule and location where piping is to be installed; be aware of how the various components will be connected such as welded, bell-and-spigot, soldered, brazed, screwed or flanged connections.

- Check drawings and specifications for any non-destructive testing (NDE) that may be required and ensure that all NDE is performed. **Ensure technicians performing NDE are properly qualified and/or certified.**

- Note location of components that are a part of the system such as valves, pumps, orifice plates, flanges**,** instrumentation connections etc. and ensure that components are installed as required.

- Inspect piping during fit-up for cleanliness making sure that all dirt, oil, grime, or other foreign matter is removed prior to final fit-up.

- Refer to governing codes and standards, drawings, and weld procedure specifications, (WPS) for welding on piping system components; ensure that welding is being performed by qualified welders and inspect welding performed on the various piping components (refer to QC procedure QC – G – 04).

- Inspect gaskets to ensure that gaskets are in good condition noting condition of bolt holes, any evidence of wear, and cleanliness of gasket.

- Ensure that all flanged joints are fit up so that the gasket contact faces bear uniformly on the gasket, and then are assembled with relatively uniform bolt stress using the prescribed torque sequence. All bolts should be engaged so that there is visible evidence of complete threading through the nut or threaded attachment. Any compound or lubricant used in threaded joints shall be suitable for the service conditions, and shall not react unfavorably with either the service fluid or the piping materials.

- For field routed piping systems, check that piping has been routed in such a manner as to avoid other systems and equipment allowing for insulation and movement that occurs during operation.

- Check drawings and specifications for other tests which must be performed on various piping systems such as air pressure tests and hydro testing. Ensure that these tests are performed as needed and document the results of these tests.

Hanger/Support Inspection

Pipe hangers form a vital part of a piping system and should be erected to ensure correct operation. Constant support and spring hangers require careful adjustment to obtain design elevations of systems and travel range of the hanger springs. When inspecting piping hangers/supports, a checklist similar to Attachment E should be used. Inspection items to be checked should include the following:

- Check piping and/or hanger drawings noting type of support (constant support, variable support, rigid, snubbers, etc.), location of support, and various component parts.

- Inspect completed hanger components to ensure that there are no loose nuts, missing washers, loose bolts etc.

- Attachment to building steel structure should be in the form of recognized standard weld lug components; all welding to the underside flange of building steel shall be parallel to the beam web; welding across the beam flange should not be allowed.

- Hangers should be installed so that their nameplates are visible and accessible.

- Constant support hangers should be provided with a permanently attached metallic scale pointer indicating the hot and cold positions on both sides. The rated load, travel, hot and cold settings, the manufacturer's serial number, and identifying hanger symbol shall be clearly marked. The load adjustment for constant support hangers is preset at the factory and should not be changed without specific instructions from the manufacturer.

- Constant support hangers must be fitted with travel stops and shall be provided with a positive and substantial means of blocking during erection and hydrostatic testing of the pipe.

- After the piping system is complete, including insulation and hydrostatic testing, ensure that the travel stops are removed and the load on the variable spring hangers are adjusted until the load indicator moves to the cold position given on the drawing. This position should be the same as the position stamped on the hanger nameplate.

- When piping is put into service, inspect the piping to make sure that the pipe is moving as intended and is not causing the hangers to deflect against travel stops or off the load or travel scale. When the system has reached normal operating temperature, inspect the spring hangers and if necessary adjust the hanger to the indicated hot position on the hanger.

- Inspect pipe risers or runs to ensure that risers are guided or anchored at locations of no movement to minimize piping stress. Sufficient restraints should be fitted in overly flexible pipe to prevent damage due to water hammer, vibration, or wind loading.

- Ensure that piping shoes or insulation saddles are installed for all insulated pipes where necessary to protect the insulation at a bearing point.

- For field routed piping systems, check supports for welding of component parts, loose nuts, bolts, etc. and ensure that supports will not interfere with other systems and/or equipment.

Instrumentation Inspection

Another vital part of any piping system is the instrumentation associated with that system. An instrumentation piping system can be defined generally as the piping and tubing system on the downstream side of the instrument root valve which is connected to the main piping, vessel, or equipment. Plant instrumentation systems control and monitor many components of the piping system such as instrument air used to open and close control valves, flow meters, temperature gauges, pressure gauges and level meters to monitor the various fluids being transported through the system.

When inspecting instrumentation, always refer to the code or standard the instrumentation has been erected to (ie. ASME or ANSI). Generally, this will be the same code governing the piping system that the instrumentation is associated with. When performing instrumentation inspection, a checklist similar to Attachment F should be used.

Items to be inspected should include:

- Check piping and instrumentation diagrams (P & I D ‘s) for location of root valves on piping systems that tubing will be welded to. Check which type of instrument the tubing will be attached to and where the instrument will be mounted (ie. locally mounted at or near the piping system or mounted in an instrumentation cabinet in a predetermined location).

- Inspect tubing to ensure that the correct size (outside diameter in inches and fractions of inches) and wall thickness (thousandths of an inch) of tubing is being used per the drawings. Tubing should be marked by the manufacturer showing type of tubing and size. Inspect tubing end preparations to ensure that tube ends are cut smooth and even and all rough edges are removed. Ensure that all filings and other contaminants are removed prior to tubing being welded.

- Check drawings and specifications for any non-destructive testing (NDE) that may be required and ensure that NDE is performed as required.

- Refer to governing codes and standards, drawings and weld procedure specifications

(WPS) for welding on instrumentation system components. Ensure that welding is performed by qualified welders and inspect welding performed on the various instrumentation components.

- Inspect support systems used for tubing routes ensuring that tubing is rigidly supported and placed in tube track on standard components and that the tubing is clamped to the tube track.

- Instrument piping should not be run or attached to electrical cable trays and in no instance shall conduit be allowed to touch sample or instrument lines. If possible, instrument lines should be run on columns and walls, but only attached to ceilings with ceiling-hung hangers.

- For a single tubing line installed in exposed locations, subject to accidental crushing or damage, the tubing line should be protected by tube track with covers, as required, and rigidly attached to the building structure by welding or bolting. When instrument lines penetrate a wall or floor, ensure that tubing and piping do not come in contact with the concrete.

- Inspect tubing bends to ensure that bends are smooth and tubing is not crimped.

- For tubing connections made with compression fitting connectors, check connectors using a fitting manufacturer's inspection gauge to be sure that couplings have been sufficiently tightened.

- Instrumentation valves should be inspected prior to installation to ensure that the valve body, material, flange, type and rating are compatible with the system into which it will be installed.

- Pressure testing for leak detection in instrumentation systems and process tubing shall be performed in accordance with the requirements of the applicable codes:

  1) Instrumentation piping may be pressure tested along with the main process piping to which it is connected.
  2) During testing, the instrumentation valve or valve manifold should be kept closed and the piping connected to the instrument (downstream) side of the closed valve shall be vented to prevent damage by over pressurization.
  3) If provision for venting is not provided in the instrument side of the instrument valve or valve manifold, the valve outlet connections should be disconnected and plugged during pressure testing.
  4) If an instrument piping system is tested separately, the instrument shall be disconnected and the test pressure shall be applied from the instrument connection and back to the main process line root valve.
  5) **Check drawings and specifications for other tests which must be performed on various piping systems such as air pressure tests and hydro testing. Ensure that these tests are performed as needed and document the results of these tests**.

6) Pneumatic lines or instrument air lines should only be tested with clean, dry, oil-free air.

Valve Inspection

There are many types of valves associated with the various piping systems. Some valves are a simple design and are manually opened or closed with a simple lever or handwheel. More intricate designs may be pneumatically or electronically controlled. Different types of valves the inspector should be familiar with could include globe valves, gate valves, butterfly valves, ball valves and check valves. When inspecting valves in a piping system, **a checklist similar to the example in the sample forms should be used.**

- For the proper procedure for receipt inspection and storage requirements for valves refer to QC procedure QC – D –01 Receipt, Storage and Handling of Products.

- Refer to codes and standards, piping drawings, instrument details, and vendor drawings to ensure valve type, material classification, valve size, and any associated instrumentation such as instrument air. Ensure that the valve is rated for service at the same operating temperatures and pressures as the piping system to which it is attached.

- Check drawings and specifications for any NDE that must be performed. Generally any NDE required of other piping system welds will also be required for any welds on valves.

- Refer to governing codes and standards, drawings, and WPS for welding of valves into a piping system. Ensure that welding is performed by qualified welders, and valve welds are inspected (refer to QC procedure QC – G – 04).

- Check interior of valves prior to installation to ensure that ports are clean and dirt, grime, grease or other contaminants have been removed.

- Inspect fit-up of valves with bolted flanges being sure that the proper gasket is being used and that the gasket is installed properly.

- Refer to manufacturer recommendations and project specifications for the proper torque sequence of bolted flanges and ensure that flanged connections are torqued per the correct procedure.

Piping System Insulation and Lagging Inspection

Piping is frequently covered by layers of insulation. Pipe insulation amounts to wrapping the pipe in a blanket of insulating material. The thickness of the blanket of insulation depends on the application. Materials used for insulation vary, and are

selected according to the requirements of the application. Typical insulating materials could include polystyrene foam, fiberglass, calcium silicate, and mineral wool. An outer wrapping may be used to protect the insulating material against the effects of water, chemicals, and mold, or other damaging conditions. For underground piping, insulation also protects against possible rusting and corrosion caused by exposure to water and chemicals in the soil. For additional protection, the outer sheathing is usually covered with a layer of a waterproofing or cement-like material called “mastic”. **Refer to the sample forms for an example of a piping insulation and lagging checklist.**

- To ensure that insulating material is received, stored and handled per requirements, refer to Receipt, Storage and Handling of Products procedure QC – D – 01.

- Refer to piping drawings, codes and standards, project specifications, and manufacturer’s requirements for the proper type and thickness of piping insulation.

- Prior to installation, ensure that piping, flanges and welds are free of all foreign matter such as dirt, grime, grit and grease.

- Check that welds and flanges are insulated with a removable type of insulation.

- Ensure that instrumentation lines are insulated up to and including the root valve of the instrument.

- Check that single layer joints are staggered, and multi-layer longitudinal and circumferential joints are staggered.

- Inspect wires or bands for proper tightening and that excess length has been cut off.

- Fittings, bends and valve bodies should be insulated with segments of block or board insulation, preformed pipe fittings or prefab blankets. Flange insulation should be beveled back one bolt length on one side of the flange with the bevel on the head side of the flange.

- Ensure that electrical tracing cable is fastened to the metal surface or an intermediate layer.

- Inspect piping insulation that penetrates floors or walls to be sure that insulation is being protected by bands or collars.

- Inspect insulation appearance to ensure that insulation is neat and convenient for equipment operation.

- If pipe hangers require insulation, they should be insulated in such a manner that will allow pipe movement without damage to insulation or jacketing.

Hydrostatic Leak Tests

Refer to the sample forms for an example of a hydrostatic testing checklist. Steps used in hydrostatic leak testing are as follows:

- Venting shall be provided at all high points of the piping system in the position in which the test is to be conducted to purge air pockets while the component or system is filling. Venting during the filling of the system may be provided by the loosening of flanges having a minimum of four bolts or by the use of equipment vents.

- Water shall normally be used **as the** hydrostatic test fluid unless otherwise specified. Test water shall be clean and shall be of such quality, as **required by the particular system**, to minimize corrosion of the materials in the piping system. **The temperature of the water and the piping system/materials shall be adjusted per applicable codes and standards**.

- Test equipment shall be examined before pressure is applied to ensure that it is tightly connected. All low-pressure filling lines and all other items not subject to the test pressure shall be disconnected or isolated by valves or other suitable means.

- Piping systems shall be subjected to a hydrostatic test pressure so that every point in the system is not less than 1.5 times the design pressure. However, the pressure shall not exceed the maximum allowable test pressure of any non-isolated component such as vessels, pumps, or valves in the system.

- Hydrostatic test pressure should be continuously maintained for a minimum of ten (10) minutes. **After the required test period, the pressure shall be reduced to normal operating pressure and the system shall be inspected for leaks.**

- Examinations for leakage shall be made of all joints and connections. The piping system, exclusive of possible localized instances at pump or valve packing, shall show no visual evidence of weeping or leaking.

- **Ensure that there is a test water disposal plan that meets all applicable regulations, codes and standards.**

Sample Forms and Checklists

Sample mechanical inspection forms and checklists can be found on the E&CS Construction Services web page via the following address:

http://powergeneration.southernco.com/depts/engineering/procedures/fh/qc-procedures.pdf

The following forms are available for use on the web site as deemed appropriate by Construction Services site management:

Exhibit 1: Mechanical Equipment Maintenance Checklist
Exhibit 2: Mechanical Equipment Installation Checklist
Exhibit 3: Rotating Equipment Data Sheet
Exhibit 4: Mechanical Equipment Pre-Startup/Operations Checklist
Exhibit 5: Piping System Inspection Checklist
Exhibit 6: Instrumentation Inspection Checklist
Exhibit 7: Insulation and Lagging Inspection Checklist
Exhibit 8: Coupling Alignment Data Sheet
Exhibit 9: Hydrostatic Leak Testing Checklist

Additional forms and checklists related to startup activities are available in the specific Startup manual for the project.

Document Control

All documentation of mechanical inspections **performed** on SCGEM **E&CS** Construction Services construction projects shall be maintained and updated until such time that equipment and/or systems have been released to plant operations personnel. At that time, all documentation shall be assembled as part of the appropriate turn over package and processed in accordance with procedure QC-I-01 Control of Quality Records and administrative procedure **3G – Processing Startup Packages**.

SCGEM Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – G – 04)

WELDING INSPECTION

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	5/10/00
0	Issued for Construction	*JME*	*RHR, Jr.*	*RWM*	6/7/00
1	Department name change; editorial changes and clarifications	*RHR, Jr.*	*RLJ*	*JCH*	12/10/02
2	Incorporate Best Practices by Civil and Mechanical QC Review Committees	*RHR, Jr.*	*JBF*	*A. Baker*	8/9/04

QC – G – 04
Welding Inspection

Purpose

The purpose of this procedure is to outline the general guidelines for the visual inspection of welding performed at SCGEM Engineering and Construction Services **(E&CS)** construction projects. For weldments that require inspection beyond the visual level, applicable NDE standards shall be referenced.

Scope

This procedure is an integral part of the SCGEM **E&CS** Construction Services Quality Assurance Program and is intended for use on SCGEM Engineering and Construction Services construction projects.

Responsibility

Generally, it will be the responsibility of the contractor to ensure that welding is performed according to the applicable section of the governing codes (ie. AWS D1.1, ANSI B31.1, ASME Boiler and Pressure Vessel Code), approved welding procedure specifications (WPS), and project specifications and drawings. **The contractor will be responsible for inspecting all welds and insuring that the welds meet all specification requirements. The contractor will also be responsible for insuring all inspection personnel possess the necessary qualifications and/or certifications to perform welding inspection.**

SCGEM **E&CS** Construction Services personnel will perform inspections ranging from random observations to total weld inspection as deemed necessary to ensure weld quality. The degree of weld inspection will be based on the structural significance, prior experience, and past observations. SCGEM **E&CS** Construction Services shall also review the qualifications of inspection personnel (reference ASNT-TC -1A) to ensure they possess the necessary skills and experience to perform required inspections**. In addition, all WPS's and welder qualification records shall be submitted to E&CS for review and acceptance.**

Safety

Every employee has an individual responsibility for his or her personal safety and for the safety of others as well. Each employee should be knowledgeable of the safety rules applicable to his or her work. Employees must accept personal responsibility

for cooperating and complying with all EH&S policies and procedures. Prior to beginning work, all employees shall review and have a thorough understanding of all applicable safety procedures contained in the E&CS Construction Services EH&S Policies and Procedures Manual.

Visual Welding Inspection

The contractor shall **insure** that welders and welding operators are qualified in the process being performed. If applicable, inspection personnel will be aware of any welder retest dates and welder's symbols. Inspection personnel shall be responsible for preparing and maintaining a Visual Weld Inspection Report as needed for inspected welds at project locations. (See Attachment A**). Where applicable, weld maps shall be used by the contractor to document the location of all welds and the identification of the welder who completed the weld.** This documentation shall be considered to be an integral part of the welding process. **As required**, inspection personnel shall monitor the welding process during the following stages for compliance to codes and specifications.

- Inspect weld joint preparation and fit-up – assess adequacy of methods of pre-cleaning per WPS **(insure removal of all dirt, oil, grease, etc.)** and check weld joint geometry, clearance dimensions, alignment and support.

- **Verify preheat requirements**

- Assess welding in progress – interpass temperature should be within nominal ranges specified in the WPS; the root pass should be inspected for condition of inside surfaces. Per AWS requirements, welding shall not be performed when:

  - the ambient temperature is lower than 0º F (-20º C)
  - surfaces are wet or exposed to rain, snow or high wind velocities
  - welding personnel are exposed to inclement conditions

- Check that work areas are being kept clean and safe; that electrode stubs and damaged electrodes are being discarded in the designated electrode disposal containers, and that electrodes are stored properly.

- Inspect post-weld clean up – weld area should be brushed or cleaned by acceptable methods and surface slag, dirt, mill scale, etc. should be removed.

- Inspect completed weld – inspect the completed weld and heat-affected zones for surface discontinuities and examine for proper weld profile and proper blending of adjoining surfaces.

- **Verify post weld heat treatment**

- Determine if weld is acceptable or unacceptable per applicable standards; if unacceptable, ensure immediate repair or place weld on hold pending corrective action. If necessary initiate a nonconformance report (NCR) and issue a Hold Tag. (Reference Procedures QC – H – 01 and QC – H – 02).

- Document the inspection on the Visual Weld Inspection Report.

Acceptance Criteria

The acceptance criteria for all welding performed on SCGEM Engineering and Construction Services construction projects will be controlled by the applicable section of the governing code, weld procedure specifications (WPS), and project specifications and drawings. In general, inspection personnel should also verify that:

1) Welds are correct size, length and placement per drawings.

2) No specific weld has been omitted.

3) No unspecified weld has been added without approval.

4) All NDE processes are performed in accordance with applicable codes and standards.

Welding Rod Composition

Welding procedure specifications (WPS) shall be referenced for required electrode composition and/or size. This shall be accomplished prior to the commencement of welding.

Welding Rod Storage

Covered electrodes shall be stored in **unopened** containers separated by AWS classification and size. Opened containers of welding filler materials shall be stored separately as follows:

- Cellulosic -Type covered electrodes (Exx10) and flux-cored electrodes shall be stored in clean, dry areas and do not need to be heated in an oven.

- Low – Hydrogen electrodes (such as Exx16 or Exx18) shall be placed in a vented electrode holding oven or in a portable rod warmer until needed; electrode types should never be mixed when issued to the welder for use.

The rod oven shall be checked to ensure that the required temperature is being maintained (250 degrees F minimum to 350 degrees F maximum). When portable rod warmers are

used, they shall be energized at all times except during transit. Portable rod ovens shall be capable of maintaining a minimum temperature of 125 degrees F. Bare welding rods, bare electrodes, and consumable insert rings shall be stored separately by AWS classification and need not be stored in heated ovens. Covered electrodes and flux-cored electrodes which have become wet or contaminated shall not be used. At completion of the assigned weld(s), all unused filler material shall be returned to storage. (Refer to AWS D1.1 sections 5.3.2.1 – 5.3.2.4) for storage and reuse of welding consumables.

Welding Machines

All machines being used for welding shall be in satisfactory working condition and set at WPS nominal amperages required to maintain a stable arc for the type and size of electrode, welding position, and particular weld joint configuration. Any unsafe conditions such as worn leads, tripping hazards, electrical shock, or fire hazards shall be noted and reported to the appropriate personnel.

Base Material Composition

Welding procedure specifications (WPS) shall be referenced to verify the required base material composition for weldments. Base material composition may be assessed by checking manufacturer mill test reports or purchase orders. Any base metal imperfections or deviations should be noted and/or rectified prior to welding.

Weld Repair/Rework

It is important that construction not progress to the point that welds can not be inspected. Inspection personnel shall be notified in a timely manner in order to inspect completed welds while the welds are still accessible. For welds that have unacceptable discrepancies and repair/rework is required, work shall be performed to the same specifications as the original weld (unless there is special engineering documentation to change processes). The completed weld shall meet **the same** acceptance standards **as the original weld**. Welds found unacceptable shall be noted on the Visual Inspection Report stating the reason(s) for rejection. If necessary, a nonconformance report (reference QC – H – 01) and/or a Hold Tag (reference QC – H – 02) may be issued. When the repaired/reworked weld has been found acceptable, the Visual Inspection Report and/or NCR report shall be updated to verify acceptance.

Document Control

All documentation of welding performed at SCGEM Engineering and Construction Services construction projects shall be maintained and updated until such time as equipment and/or systems have been released to plant operations personnel. At that time, all documentation

shall be assembled as part of the appropriate turn over package and processed in accordance with procedure QC-I-01 Control of Quality Records.

Visual Weld Inspection Report

Sections that are not applicable shall be indicated as N/A

Weld No.	Drawing No. & Rev.	System
Weld Location/Area		Code/Standard
Welder/Symbol		WPS No. & Rev.
Material Classification		No. of Pages Attached
Component (Size & Material-Pipe/Plate)		
Welded to Component (Size & Material-Pipe/Plate)		

Note: In the remarks section indicate inspections performed along with acceptance/rejection of weld(s) giving reason(s) for rejection. Follow-up inspections of repaired/reworked welds should be so noted with reasons for original rejection, initial inspection date, type of repair/rework performed, and reasons for acceptance/rejection of completed weld. Final acceptance date of weld(s) should be noted in the date section below.

Remarks _____

Inspector _____ Date _____

Attachment A

SCG Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – G – 05)

Fiberglass Manufacture and Installation Inspection

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	8/10/05
0	Issued for Construction	*RHR, Jr.*	*JBF*	*C.A. Baker*	8/30/05

QC – G – 05

Fiberglass Manufacture and Installation Inspection

Purpose

The purpose of this procedure is to outline the general guidelines necessary for the inspection of fiberglass components manufactured and installed on SCG Engineering and Construction Services (E&CS) construction projects.

Scope

Items covered under this procedure shall include, but not be limited to, raw materials used in the process, vendor manufactured products, work in process, finished products and proper receipt, storage and handling of all materials.

Generally, the components and items discussed in this procedure should be received, stored, maintained, manufactured, and installed in accordance with manufacturer's recommendations and the specific requirements listed in the project specifications and drawings. In lieu of manufacturer's recommendations and specifications, the guidelines in this procedure should be followed.

This procedure is an integral part of the SCG E&CS Construction Services Quality Assurance Program and is intended for use on SCG E&CS Construction Services construction projects.

Responsibility

Generally, it will be the responsibility of the contractors employed by SCG E&CS Construction Services to ensure that all components are manufactured, stored, maintained, handled, and installed in accordance with the specifications and industry best practices. SCG E&CS Construction Services reserves the right to perform inspections and tests as deemed necessary to ensure that the quality of items is maintained.

The contractor shall implement a quality control (QC) program, which verifies and documents that equipment and fabrication operations comply with the project specification and drawings.

As a minimum, the QC procedure shall include adequate inspection and/or testing to verify and document the following:

- Allowable visual defects
- Sequence and thickness of laminates
- Glass content of laminates
- Barcol hardness
- Lack of acetone sensitivity
- Dimensional tolerances
- Conformance to Design Drawings/Details
- Surface preparation prior to secondary overlays
- Environmental conditions during fabrication
- Peel testing
- Proper receipt, storage, and handling of materials
- Traceability
- Proper mixing techniques

A QC Manual covering all procedures, inspection forms, testing and inspection requirements, organizational responsibilities, and other information as needed to completely describe the Contractor's QC activities shall be submitted to the Purchaser for approval. The submittal shall include a project specific Inspection and Test Plan (ITP) containing each item to be checked, and including frequency, acceptance criteria and document reference.

The Contractor's QC records shall be made available for the Purchaser's review at all times during the fabrication.

Safety

Every employee has an individual responsibility for his or her personal safety and for the safety of others as well. Each employee should be knowledgeable of the safety rules applicable to his or her work. Employees must accept personal responsibility for cooperating and complying with all EH&S policies and procedures. Prior to beginning work, all employees shall review and have a thorough understanding of all applicable safety procedures contained in the E&CS Construction Services EH&S Policies and Procedures Manual.

Bonder Qualification

At the option of Engineering and Construction Services (E&CS), the Contractor and/or FRP Joining Subcontractor will be required to prepare a Bonding Procedure Specification (BPS) and implement a procedure that qualifies the BPS and the performance of each employee (bonder) directly performing the joining.

The qualification procedure shall be in accordance with ASME B31.3. The BPS shall be based on the project specification, with additional information as required by ASME B31.3.

Reference Documents

The latest revision of the following specifications and industry standards shall be considered an integral part of this Procedure where applicable.

Standards

American Society of Mechanical Engineers

- ASME RTP-1 Reinforced Thermoset Plastic Corrosion Resistant Equipment.

American Society for Testing and Materials (ASTM)

- ASTM D 638: Standard Test Method for Tensile Properties
- ASTM D 790: Standard Test Method for Flexural Properties of Reinforced Plastics
- ASTM D 883: Definitions of Terms Relating to Plastics
- ASTM D 2471: Standard Test Method for Gel Time and Peak Exothermic Temperature of Reacting Thermosetting Resins
- ASTM D 2563: Classifying Visual Defects in Glass-Reinforced Plastic Laminates
- ASTM D 2583: Method of Test for Indentation Hardness of Plastics by Means of a Barcol Impressor
- ASTM D 2584: Method of Test for Ignition Loss of Cured Reinforced Resins
- ASTM D 2925: Standard Test Method for Beam Deflection
- ASTM D 3567: Practice for Determining Dimensions of Reinforced Thermosetting Resin Pipe and Fittings
- ASTM D 5364: Standard Guide for Design, Fabrication, and Erection of Fiberglass Reinforced Plastic Chimney Liners with Coal-Fired Units

Conflicting documents shall be brought to the attention of Construction Services.

Terminology

Refer to the glossary found as attachment I of this procedure, and consult the appropriate project specifications for the correct terminology as it relates to that project.

Inspection for the Receipt, Storage, and Handling of Fiberglass Components

All components covered by this procedure shall comply with the general guidelines outlined in quality procedure QC-D-01: Receipt, Storage and Handling of Products. The Receiving Report included in procedure QC-D-01 shall be used as applicable. Utilize the procedures and sample forms contained herein to accomplish the quality control tasks listed below.

The following are minimum inspection items that should be verified for receipt, storage, and handling of fiberglass components.

Raw Materials

Resin

Resins, promoters, catalysts and other process chemicals should be stored in clean, sealed, and clearly marked containers and be clearly marked with the correct HAZMAT labeling. Items shall be stored in a manner that ensures that any required temperature limitation are maintained.

MSDS for all materials must be on site at all times.

Fiberglass materials should be kept in a clean dry condition.

In addition, the following specific requirements apply:

The supplier of resin is responsible for providing a Certified Test Report, which shall include the following information:

- Resin Type and Identification
- Name of Manufacturer
- Batch Number
- Date of Manufacture
- Drum or Bulk Number
- Resin ID Number
- Gel Time Test Results
- Viscosity Test Results
- Manufacturer's Specified Shelf Life

In addition to the above, the resin container shall be inspected for damage or punctures to the drum or top.

The resin shall be inspected to ensure that there is no moisture present on the surface of the resin or any foreign materials present in the resin.

This information shall be documented and reviewed for conformance to specification requirements prior to acceptance and use in the field.

Glass Reinforcement

The supplier of the fiberglass is responsible for providing a Certified Test Report or a Typical Properties Report, which shall include the following information:

- Glass Type
- Name of Manufacturer
- Batch Number
- Bulk Number
- Date of Manufacture

In addition to the above and the requirements of QC-D-01, upon receipt, the fiberglass components shall be inspected for any evidence of the following:

- Moisture or evidence of previous exposure to moisture
- Material separation
- Frayed strands
- Dirty or contaminated material
- Binder quality

Glass that does not meet the acceptance standards of the glass manufacturer shall not be used.

Vendor Supplied Fiberglass Components

A Certified Test Report should accompany all vendor-supplied components. The Certified Test Report should contain, as a minimum, the following information:

- Part or Batch Number
- Date of Manufacture of each part
- Appropriate test(s) and/or inspections to ensure the quality of each part:
  - Dimensions
  - Visual Defect Inspection
  - Barcol Hardness
  - Glass or Resin Content of the laminate

Inspection and Testing of Manufacturing Process

Inspection and Testing shall be performed as required by the Contractor's approved ITP.

General Requirements are as follows;

Resin Testing

Contractor shall test resin to establish cure characteristics and verify that it meets the acceptance standards of the resin manufacturer.

Gel time of the resin shall be checked daily using the procedure and form included in this procedure as Attachment A.

Resin testing shall be performed in accordance with ASTM D2471. Gel time, time to peak exotherm, and peak exotherm temperature shall be recorded.

If resin is used in the form it is received, one test shall be performed for each manufacturer's batch number.

If resin is altered with additives, one test shall be performed for each drum of resin, or portion thereof, that is mixed with additives.

Documentation shall be provided for each test that includes resin type, manufacturer, batch and lot number, drum number, listing and amount of additives, description and manufacturer of additives, catalyst type and amount.

Minimum Barcol hardness for all finished laminates is 90% of the resin manufacturer's recommendation for Barcol hardness, unless noted otherwise.

Peel Testing

Peel testing shall be employed to verify bond strength for secondary overlays, such as when bonding to cured laminates after a prolonged stoppage, or when surfaces have potentially been contaminated. Peel testing will be performed as directed by Construction Services.

Peel test laminates shall be removed for evaluation in the presence of Construction Services.

If peel tests show any indication of a substandard bond, the area shall be retested. Changes in surface preparation procedures, types of materials used, or modification of environmental conditions may be required to enhance the bond to an acceptable level.

Construction Services reserves the right to require additional peel tests as deemed necessary. A summary of the Peel Test procedure is found in this procedure on Attachment H.

Sample Testing

Contractor shall extract samples from the laminates in the sizes and at locations identified by E&CS or in the ITP. Samples shall be clearly marked to indicate the location from which they were taken.

One sample from each area shall be provided to Construction Services, and a second sample from each area shall be tested and documented by the Contractor as follows:

Measurements shall be taken and recorded of total thickness, corrosion liner thickness, and structural laminate thickness.

Separate the corrosion liner from the structural laminate and determine glass content for each per ASTM D 2584. Attachment B is a summary of this test method. Record the sequence of individual reinforcement plies from the remains of the ignition test.

If necessary, sample holes shall be repaired with a procedure approved by E&CS.

Certain testing and inspections are required to verify that materials and fiberglass components are in conformance with the project requirements. The following is a table that, as a minimum, details the test and the frequency of that test. Utilize the procedures and sample forms contained herein and refer to the specific ASTM specification to accomplish the quality control tasks listed below.

Test	Frequency/Interval	Reference
Daily Resin Gel Test	At the start of each day's operation Every change in promotion schedule Each new resin batch. Each new drum.	Attachment A
Burn Test	As required per the specification requirements and agreed upon between the Purchaser and Fabricator	Attachment B
Barcol Hardness	Every part/FRP product made. Secondary laminates Vendor Supplied FRP products	Attachment C
Acetone Sensitivity Test	All FRP components produced. Sampling of HLU products made. Vendor Supplied FRP products received on site.	Attachment D
Visual Inspection	All parts manufactured. All FRP products received on site	See Explanation Below
Dimension Verification	All parts manufactured. All assemblies produced on site All FRP products received on site	Attachment E
Component/Vessel Installation	Required for the installation of nozzles, etc.	Attachment F

Surveillance Inspection Checklist	Frequency as approved by the Purchaser and more frequently if discrepancies are found	Attachment G
Peel Bond Test Procedure	Assembly of secondary laminates	Attachment H

Visual Inspection

All laminates shall be visually inspected on interior and exterior surfaces.

In lieu of specific project requirements, the Contractor shall establish a visual inspection program, based on RTP-1 (Table 6-1, Level 2) criteria.

Allowable visual defects apply to small-localized areas of no more than 1 square foot and shall not be repeated in adjacent areas within a radius of 4 feet..

Dimensional Tolerances

ASME RTP-1 shall be used as a reference for acceptable dimensional tolerances; however, specific requirements of the project specifications and drawings shall always govern and supersede the requirements of RTP-1.

Documentation

Written certification of all required inspection and tests is necessary prior to product acceptance. Relevant paper work, as required by the approved QC program shall be completed within 8 hours of each inspection or test and made available to Construction Services for review.

The Contractor shall maintain a file of all documents required for the project, including inspection records traceable back through the production process and records of receipt and inspection of raw materials, such as resin and glass reinforcement lot numbers. These records shall state the specifications governing the receipt and inspection of the materials and shall include results of all testing.

All QC documentation shall be available at the jobsite for review at anytime by Construction Services. The Contractor shall provide to Construction Services detailed records of all inspections and test results including the following:

- Daily QC checklist and summary.
- Measurements of wet bulb, dry bulb temperatures, relative humidity, and dew point temperatures of the fabrication space and materials, taken at the beginning of each shift and after the lunch break during all laminating work.notation of all deviations and corrective measures taken.
- Notation of any damaged components and corrective measures taken

E&CS QA Oversight

General

E&CS reserves the right to visit, inspect, witness, or observe any fabrication, evaluation, or test performed on components being fabricated. E&CS also reserves the right to use a qualified third party representative for such surveillance.

E&CS shall be given access to the equipment, fabrication area and all quality control records during fabrication and upon completion, for the purpose of verifying compliance to project specifications.

All phases of fabrication shall be subject to inspections by E&CS. E&CS shall be provided free access during working hours to check all work as well as any documentation relating to the work.

The Contractor must ensure that the fabrication area is safe for entry and must provide safe access for the E&CS personnel. Scheduling of inspection, due to limited accessibility, shall be coordinated with the Contractor, (i.e., use of existing scaffolding, man-lifts, temporary platforms, etc.) Mold releases, dust, or any coatings that may restrict visual laminate inspection shall be removed.

The Contractor shall provide advance notice to E&CS (at least 8 hours prior) of the following milestones for use in scheduling inspections of any equipment, and to witness any testing required by quality control procedures, and project specifications. A decision by E&CS not to inspect or witness tests shall in no way relieve the Contractor from full responsibility for the quality and correctness of the work. The following milestones shall be considered hold or witness points:

- Beginning of fabrication of components.
- Completion of shop components, prior to shipping.
- Beginning of application of corrosion liner for each major component.
- Beginning of the filament winding for each shell section.
- Beginning of each significant joining.
- Final completion.

Above milestones are of particular importance on first article inspections. Additional milestones may be included as requested by the E&CS.

Inspection by E&CS does not relieve any responsibility of the Contractor to meet the requirements of this specification.

E&CS retains the right to employ any of the following techniques as a part of the inspection:

- Photography.
- Magnification or other special viewing techniques.
- Ultrasonic, magnetic or other special non-destructive measurement techniques.
- Barcol hardness testing.
- Acetone sensitivity testing.

Final Inspection

E&CS will carry out a final inspection of the equipment prior to shipment from the shop for shop fabricated parts, or prior to Contractor's demobilization from the job site for field fabricated parts. Contractor shall give E&CS a minimum of five days advance notice of completion.

Prior to final inspection by E&CS, equipment shall be cleaned of all foreign material, and obstructions to the inspection shall be removed.

Key Inspection Attributes:

Major manufacturing and assembly tasks are listed below with important QA/QC considerations for each phase of fabrication. It is the responsibility of the contractor or fabricator to insure compliance to these key inspection attributes.

General Fiberglass Manufacturing and Installation Inspection

Quality Control is the responsibility of the fabricator throughout the manufacturing and assembly process. E&CS is responsible for verification of the contractor/fabricator's inspection and testing plan, (ITP)

Key Inspection Attributes:

The following are inspection areas that should be checked and/or verified during general fiberglass manufacturing operations. Specific inspection guidelines and procedures are found in this document under specific areas of manufacturing such as piping. The procedures and sample forms contained herein define inspection points and required data to accomplish the quality control tasks listed below.

- Materials receiving and storage
- Inspection of the manufacturers quality control (QC) procedure
- Qualifications of the QC inspector and laminators (form and frequency)
- Allowable visual defects
- Laminate construction sequences and thickness
- Glass content of laminates
- Cure of laminates (Barcol hardness)
- Acetone sensitivity

- Dimensional tolerances
- Surface preparation prior to secondary overlays.
- Environmental conditions during fabrication and installation
- Peel testing (as appropriate)
- Resin, catalyst, and additives usage
- Reinforcement and other materials usage
- Promotion and catalyzation procedures
- Molds and tooling
- Manufacturers/contractors lab/testing ability
- Workmanship
- Exterior surface coating
- Identification tags or labels
- Handling and storage procedures
- Where possible verify actual weight of completed component, such as weight of pipe, stack liner can, tank, etc.
- Completion of pressure testing as required
- Finished fiberglass component is clean

Resin Promotion and Catalyzation Process Inspection

Verify that this process is performed in accordance with the project specifications and the resin manufacturers requirements. Utilize the procedures and sample forms contained herein to accomplish the quality control tasks listed below.

Key Inspection Attributes:

The following are minimum inspection issues that should be checked and or verified during the resin promotion and catalyzation activities.

- Ensure that resin, catalyst, and all additives, meet the specification requirements.
- Mixing procedures
- Percentage of promoters and additives that are added to the resin
- Delivery of correct amount of catalyst to resin during fabrication operations
- Testing such as gel testing, are performed prior to usage of resin

Pipe and Duct Manufacturing Inspection

Verify that pipe and duct manufacturing activities are being performed in accordance with the project specifications, procedures, and drawings. Utilize the procedures and sample forms contained herein to accomplish the quality control tasks listed below.

Key Inspection Attributes:

In addition to the attributes found in the "General Fiberglass Manufacturing and Installation Inspection" section of the procedure, the following are inspection issues that should be checked and/or verified during the on site pipe and duct manufacturing process.

- Diameter
- Liner application
  - Thickness and laminate sequence
- Structural laminate application
  - Thickness and laminate sequence
- Filament winding application (if applicable)
  - Filament winding strand yield
  - Filament winding bandwidth
  - Filament winding band strands per inch
- Proper wet out
- Hand lay up procedure (if applicable)
- Roundness and concentricity
- Application of all buildups such as stiffeners, support pads, bells, etc.

Fittings Manufacturing Inspection

Verify that fittings manufacturing activities shall be performed in accordance with the project specifications, procedures, and drawings. Utilize the procedures and sample forms contained herein to accomplish the quality control tasks listed below.

Key Inspection Attributes:

In addition to the attributes found in the "General Fiberglass Manufacturing and Installation Inspection" section of the procedure, the following are inspection issues that should be checked and/or verified during on site fittings manufacturing process.

- Correct diameter
- Liner application
  - Thickness and laminate sequence
- Structural laminate application
  - Thickness and laminate sequence
- Flange fabrication to include:
  - Flange thickness
  - Flange flatness
  - Flange drilling
  - Flange hub
  - Integral manufacturing method
- Flange type (for example, stub end, full faced drilled, etc.)

Tank, Stack, and Vessel Manufacturing Inspection

Tank, stack, and vessel manufacturing activities shall be performed in accordance with the project specifications, procedures, and drawings. Utilize the procedures and sample forms contained herein to accomplish the quality control tasks listed below.

Key Inspection Attributes:

In addition to the attributes found in the "General Fiberglass Manufacturing and Installation Inspection" section of the procedure, the following are inspection issues that should be checked and/or verified during the tank and vessel manufacturing process.

- Correct diameter
- Liner application
  - Thickness and laminate sequence
- Structural laminate application
  - Thickness and laminate sequence
- Filament winding application (if applicable)
  - Filament winding strand yield
  - Filament winding bandwidth
  - Filament winding band strands per inch
- Proper wet out
- Large hand lay up process:
  - Shell
  - Bottom
  - Top
- Special internal or external components
- Bottom knuckle application
- Roundness and concentricity
- Alignment of shell to major joined sections, such as dome top and flat bottom
- Where applicable, flatness of bottom to pad and correct set up
- Secondary laminations
- Placement of anchor lugs, lifting lugs, ladder attachments, pipe guides, and other attachments
- Additional lamination for stiffeners, buildups, support pads, bells, and other fiberglass work
- Inspect cutouts
- Application of insulation jacket (where applicable)
- If oblation is required, ensure that no micro cracking exists at the time of oblation and assembly
- Non-skid application (if required).
- Gussets (where applicable).

Joining and Assembly Inspection

Verify that joining and assembly activities are performed in accordance with the project specifications, procedures, and drawings. Utilize the procedures and sample forms contained herein to accomplish the quality control tasks listed below.

Key Inspection Attributes:

In addition to the attributes found in the "General Fiberglass Manufacturing and Installation Inspection" section of the procedure, the following are inspection issues that should be checked and/or verified during the joining and assembly process.

- Correct components to be joined
- Facility/site has a dedicated quality control inspector and qualified bonding/assembly crew
- Surface preparation prior to secondary overlays
- Component fit up
- Environmental conditions at time of lamination
- Peel testing (if appropriate)
- Resin, catalyst, and additives usage
- Reinforcement and other materials usage
- Promotion and catalyzation procedures
- Laminate sequence and width
- Repair procedure (if any)
- Documentation

Non-conformance Reporting, Hold Tag Requirements and Repairs

Quality control procedures QC – H – 01 Nonconformance Reporting and QC – H – 02 Hold Tags shall be referenced for guidelines covering the initiation, follow-up and resolution of nonconforming items associated with items covered by this procedure.

A component will be considered to be a non-conformance when it is found to deviate from the Specifications or Design Drawings.

All non-conformances shall be documented and immediately brought to the attention of E&CS.

Damaged material and material not conforming to the Specifications and approved drawings may be rejected by E&CS at any time.

The Fabricator shall correct or replace any components in non-conformance.

Any repairs recommended by the Contractor shall be submitted to E&CS for approval prior to implementation.

Document Control

All documentation of inspections performed on fiberglass components manufactured and installed on SCG E&CS Construction Services construction projects shall be maintained and updated until such time that equipment and/or systems have been released to plant operations personnel. At that time, all documentation shall be assembled as part of the appropriate turn-over package and processed in accordance with procedure QC-I-01 Control of Quality Records and administrative procedure 3G – Processing Startup Packages.

Resin Evaluation & Test Procedure ASTM D2471

Following is a summary of the test method. Refer to the indicated ASTM for specific instructions on performing this test.

Gel Time:

Gel time is defined as the timer interval between the mixing of a resin with catalyst and promoter, and the point where the mixture becomes unworkable due to gelation.

Gel time tests follow this procedure:

1. Make a note of all information on the resin to be tested, including type of resin, resin manufacturer, date of manufacture, batch and drum numbers, and date of test. If required, note type of promotion and type of catalyst, including percent used in the test. Also, if required, include temperature at time of test.

2. Set gel time counter to zero.

3. a. When using a Gel Timer, weigh and place 200g sample of resin in a paper cup, measure and add an appropriate amount of catalyst and mix for at least one minute.

   b. When using a “Hot Pot” Gel Timer, set the thermostat at the desired test temperature (usually 70 deg. F to 75 deg. F). Weight and place a 100g resin sample in an aluminum gel cap. Measure and add an appropriate amount of catalyst and mix for at least one minute.

4. Place the sample in the gel timer.

5. Insert a wire utensil and stir.

6. When the resin gels, note the time shown on the counter and record it on the Resin Evaluation & Test Log.

7. Record comments, if any, and sign the log.

Viscosity Test:

Responsibility for viscosity testing is left to the manufacturer of the resin. SCG E&CS requests a full report on this test at the time of delivery of the resin.

Daily Resin Gel Test (ASTM D 2471)

Date:
Resin Lot Number:

Resin Type: _____

Catalyst Used: _____

Additives:

	Amount		Comments
Additives include:	Wt.	%	
Cobalt (6%)			
DMA			
Antimony Trioxide			
2-4 P			
SAG 47			
Other:			

GEL TEST:

Time of Test	Percent/ Amount of Catalyst Used	Resin Temp.	Dew Point	Relative Humidity	Ambient Temp.	Mandrel Temp.*	Gel Time	Inspector's Initials**

* = Mandrel temp. only need for liner resin.
**= Inspector to initial each test.

Glass & Resin Content in Laminates (Burn Test) ASTM D-2584

Following is a summary of the test method. Refer to the indicated ASTM for specific instructions on performing this test.

1. This test follows ASTM Designation D-2584. Line names indicated refer to lines on the Ignition Loss Report (See Appendix "G").

2. Fill out background information on the Ignition Loss Report.

3. Cut several 1" by 1" sample pieces; note their thickness on line C.

   a. When filament wound pipe is to be burned, the liner and winding should be separated and burned individually. Indicate type of material being burned in Section B, "Type of Sample".

   b. When hand lay-up samples are to be burned, do not separate laminate from liner. Burn as a composite laminate, and mark the "Hand Lay-up" box in Section B.

4. Number and mark each crucible. Note crucible numbers on Line A.

5. Number and mark each crucible on a gram scale and note the weight on Line E.

6. Place one sample in each crucible, and weigh the crucible and sample together. Note the weight on Line D, "Weight of Sample+Crucible Before Burn".

7. Subtract Line E from Line D to get Line F, "Weight of Sample".

8. Place crucibles in a burn oven set at 1,150 deg. F - 1,200 deg. F. The oven should be preheated to burn temperature before insertion of samples. Once samples are in the oven, turn the fan on. Burning of samples will take two to four hours, depending on sample thickness.

9. When all the resin has burned off and only glass remains in the crucible, weigh the sample and crucible together. Note the weight on Line G.

10. Subtract Line G from Line D; note the difference on Line H.

11. Subtract Line H from Line F; note the difference on Line I.

12. Divide Line H by Line F; note the result on Line J (% resin).

13. Divide Line I by Line F; note the result on Line K (% glass).

14. Fill in the remaining portion of the sheet and sign.

Attachment B
Page 1 of 2

"Burn Test" - Ignition Loss Report ASTM D 2584

Date of Test:_____ Job:_____

Sample Description:_____

A) Crucible No.:							
B) Type of Sample (Check Appropriate Box)							
Liner Only							
Filament Winding							
Liner & Winding							
Hand Lay-up							
C) Sample Thickness							
D) Weight of Sample + Crucible Before Burn							
E) Weight of Crucible							
F) Weight of Sample							
G) Weight of Sample + Crucible After Burn							
H) Weight of Resin							
I) Weight of Glass							
J) % Resin							
K) % Glass							

Comments:

Signed:_____

Attachment B
Page 2 of 2

Barcol Hardness Measurement ASTM D 2583

Following is a summary of the test method. Refer to the indicated ASTM for specific instructions on performing this test.

1. Fill out background information on the Barcol Hardness Report, including date of test, description of sample, and the specified Barcol for the test.

2. Note and record the areas from which the readings have been taken (shell interior, bottom interior, overlays, etc.) in the boxes labeled A through H.

3. Check the calibration of the Barcol Impressor with an aluminum calibration disc before taking any readings.

4. Take ten (10) readings from each area listed. Record each reading in lines 1-10 on the report.

5. Discard the two lowest and two highest readings, and average the remaining six readings.

6. Compare the averages for each location to the specified Barcol for the test. Make a note of whether or not they conform. Make any necessary comments and sign.

Attachment C
Page 1 of 2

Barcol Hardness Report ASTM 2583

Date of Test:_____ Job:_____

Sample Description:_____

Specified Barcol:_____

Location Reading #								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
SUM								
Sum Without 2 Low/High								
Average of Six								
Conform:								

Signed:_____

Dated:_____

Attachment C
Page 2 of 2

Acetone Sensitivity Test

An Acetone Test should be applied to any secondary laminate surface, within the following parameters:

- Perform three (3) tests per quadrant per specific elevation, or perform three (3) tests per joint.
- Acetone used for testing must be clean.

Acetone Testing Procedure:

1. Note test location--elevation and radial location (in degrees--see drawings for reference) on the Acetone Sensitivity Report Form.

2. Apply 5 drops of acetone to a small area of the laminate surface.

3. With a clean finger, rub the acetone into the surface until the liquid evaporates.

4. Check the laminate surface for tackiness.

5. If the laminate feels tacky, note a “fail” on the test report. If not, indicate passage by checking “OK” on the report.

6. Sign the report.

Acetone Sensitivity Test Report

Job:_____

Signed:_____

					Check One		
Line No.	Date	Time	Elevation (ft. & in.)	Location (deg.)	OK	Fail	Other Entries*

* = Refer to related entries by line number.

Dimension Inspection

Test all goods, whether manufactured or purchased, for the following:

a. Flatness.
b. Roundness.
c. Size.
d. Assembly Dimensions:
   --Degrees and Elevation of all nozzles on shell wall.
   --Degrees and Length of Radius for all nozzles on cover.
e. Thickness.

Refer to project engineering drawings for reference to specified dimensions. ASME RTP-1 should be used as a reference if specific dimensional tolerances are not given in the site specific specifications and drawings.

Dimensional measurements should be recorded on a log similar to the attached Dimensional Inspection Log.

Attachment E
Page 1 of 4

Dimension Inspection Log

Job:_____ Date:_____

Refer to drawings and specifications for dimensional guidelines.

Item	Measure. Type	Dimensions or Orientation	Drawing Specification	Tolerances (refer**)	Accept	Reject

Mandrel Dimensional Check

Refer to job site specifications for specific acceptance criteria.

Vessel Number:_____Pull Number:_____

Dimension

Concentricity
(Acceptance Criteria:
_____on diameter)

0 degrees - 180 degrees F_____

90 degrees - 270 degrees F_____

Pi Tape Reading
(Acceptance Criteria:
_____on diameter)

Base Ring _____

Mid Ring _____

Top Ring _____

Levelness of Mold Panels
(Acceptance Criteria:
_____per foot)

+/ - _____

Appearance of Mold Panels
Cleanliness
Absence of burrs
Indentations
Plate joints match up

Accepted: _____

Rejected: _____

Has laser been retargeted?
Must be done after each part removal

Accepted: _____

Rejected: _____

Foreman/Operator

_____
(name) (date)

Contractor Inspector

_____
(name) (date)

Setting Base Can Inspection & Acceptance

Refer to job site specifications for specific acceptance criteria

Vessel Number_____

Drawing Number_____

Tolerance	Accepted	Rejected	Remarks
Is vessel level within tolerance. Acceptance criteria: _____	☐	☐	_____
Is vessel square to datum plane w/in tolerance? Acceptance criteria: _____	☐	☐	_____
Is vessel orientation w/in tolerance? Acceptance criteria: _____	☐	☐	_____
Are elevations w/in tolerance. Acceptance criteria: _____	☐	☐	_____

Comments:

_____

_____

_____

Action Required:

_____

_____

Accepted ☐

Rejected ☐

Contractor Inspector

_____

name) (date)

Component/Vessel Installation Inspection

Job:_____ Contract #:_____

Item:_____ Drawing #:_____ Rev. #:_____

W.O. #:_____

	Per Drawing	Layout By: (Initial/Date)	Checked By: (Initial/Date)	Verified By: (Initial/Date)
Layout				
Nozzle Size				
Elevation				
Orientation				
Set				
Bolt Holes				
Extension				
Level				
Plumb				
Installation				
Final Lay-up				
Wax Coat				

Comments:

_____

_____

_____

_____

Note: Subject checks are to be made prior to secondary bonding, hole drilling, installation, critical cuts, etc.

Attachment F
Page 1 of 1

Surveillance Inspection Checklist

Job:_____ Date:_____

A. Materials Storage and Handling	Check One	
	Acceptable	Not Acceptable
Process Chemicals:		
Containers Sealed		
Containers Marked		
Containers Clean		
Fiberglass Materials		
Well Organized		
Clean Area		
Dry		
Pumping Equipment		
Cleaned & Flushed		
General Storage Area		
Cleanliness		
Dryness		
B. Work Areas		
Winding Area:		
Fiberglass Materials		
Covered & Clean		
Resin Baths & parts		
Cleared		
Process Chemical Containers		
Stored		
Mold Surface Area:		
Molds, Fittings, Patterns		
Kept Clean, Dry		
Fiberglass Materials Covers and Clean		
Process Chemicals Stored		
General Area Cleanliness		
Tools & Equipment:		
Cleanliness		
Condition		
Work Surfaces Condition		
C. Parts Procurement Rather Than Manufactured on site		
Stored in Safe Location		
Adequately Supported		
Protected from Elements		

Comments:_____
_____
_____

Name_____ Date_____

Attachment G
Page1 of 1

Peel Bond Test Procedure

General Method for Performing Peel Test

A Peel Bond Test is performed to test secondary bonding performance. It should also be run prior to the start of work to verify proper application technique.

First the area to be bonded is properly prepared by grinding with a 16 or 24 grit disk. This removes any paraffinated resin or contaminants. Or in the case of the mold surface, it roughens the surface and exposes glass fibers.

Next a piece of mylar is taped over 1/2 of the area to be tested.

Next a laminate is prepared consisting of 3 layers of 1-1/2 ounce mat* cut to 6" x 12" along with a proper amount of resin and catalyst.

Next the glass is wet out and applied over the test area being careful to center the laminate over the prepared area and the mylar area, i.e., 6" x 6" over the mylar and 6" x 6" over the prepared area.

After the laminate has properly cured, the laminate is removed by lifting along the no bond mylar side and pulling the laminate free from the test area.

If the laminate pops free from the test area with little or no fibers tearing, it has failed the test. The prepared area needs to be inspected to see if it was ground properly to the right profile and to see if all contaminants have been removed.

If the laminate tears loose exposing numerous fibers along this substrate, the test shows that a proper bond has been achieved.

*Some specifications may also include 1 layer of 24 ounce woven roving

Peel Bond Test Report

Date of Test:_____ Location:_____

Part Description:_____

(If more than one area will be tested on a particular part, a map of the part showing the numbered test areas should be attached to this report.)

Area Number	Accept	Reject	Comments
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

CONTRACTOR INSPECTOR:_____ Date:_____

Attachment H
Page 2 of 2

GLOSSARY

Air Bubble – Air entrapment within and between the plies of reinforcement, usually spherical in shape.

Barcol Hardness – A hardness value obtained by measuring the resistance to penetration of a sharp steel-point under a spring load. The hardness value is used as a measure of the degree of cure of a laminate.

Burned – Showing evidence of thermal decomposition through some discoloration, distortion or destruction of a laminate and usually resulting from excessive exotherm temperatures.

"C" Glass – Monofilaments of corrosion resistant "C" grade glass commonly used on the interior surface of a laminate in contact with corrosive process stream. Also known as "C" veil.

Catalyst – A liquid or paste formulation which, when added to resin, markedly accelerates the cure.

Chip – A small piece broken off a laminate edge or surface.

Cobalt Napthenate – A dark purple liquid formulation of active cobalt in a solvent. Used as a promoter in resin to speed up and control cure.

Corrosion – The action of the chemical environment on the resin or reinforcements causing a loss of physical strength and material.

Corrosion Barrier – The process side of an FRP laminate normally consisting or surface veil(s) and chopped strand mat. The corrosion barrier, also known as the liner, may occasionally be on the exterior surface.

Crack – An actual separation of the laminate, visible on opposite surfaces and extending through the thickness; a fracture.

Crazing – A form of random and shallow cracking that occurs in the outer 5 to 10 mils on the exterior or interior surface of a laminate.

Cumene Hydro Peroxide (CHP) – A liquid catalyst used with reactive resins to reduce high exotherm temperatures.

Defect – A condition in a laminate that may compromise corrosion resistance or structural integrity. The defect may have been designed or manufactured into the laminate, damaged in transit or installation, or resulted from operating or upset conditions.

Delamination – The separation of layers of material in a laminate.

Attachment I
Page 1 of 4

Dimethylaniline (DMA) – A liquid solution added to resin to accelerate the rate of cure.

Dry Spot – An area of incomplete surface film where the reinforcement has not been wetted out with resin.

Exotherm – That point in the curing process of resin where heat is given off as a by-product.

Fiber Prominence – Distinctly visible glass fibers in a cured laminate. Similar to jackstraw.

First Article Inspection – An inspection conducted on the first part in a series to ensure that all construction details such as dimensions, resin, reinforcements, etc. are correct on this very first part. An example would be inspecting the first pipe in a series of ten pipe to ensure conformance to specifications and drawings.

Filament Winding – A process for fabricating a composite structure in which continuous fiber reinforcements are saturated with resin and mechanically wound onto a mold in a previously prescribed manner, producing a laminate designed to meet certain stress conditions.

Foreign Inclusion – Any inclusions in a laminate, which are foreign to its composition.

Fracture – Rupture of a laminate surface without complete penetration.

Gel Time – The time span between catalyzation of a resin and gelation.

Hand Lay-Up – Laminates produced by hand-applied methods, usually using alternating layers of mat and woven roving.

Jackstraw – Distinctly visible glass fibers in a cured laminate. Similar to fiber prominence.

Laminate – Multiple layers of glass held in matrix with a cured resin.

Liner – The process side of a laminate usually consisting of surface veil(s) and chopped strand mat. Also known as the corrosion barrier.

Mat – Fiber reinforcement made of "E" glass cut into 0.5" to 2" lengths and held loosely together by a resin binder soluble in styrene.

Methyl Ethyl Ketone Peroxide (MEKP) – Standard catalyst used to cure resin.

Mylar – Polyester film 1 to 2 mils thick used as a release film in wet laminate work. The film imparts a mirror-smooth finish to cured laminates. Also used for photographic documentation of a mylar control area (defects).

Oblation – This is a process whereby a circular section of a large diameter fiberglass reinforced plastic tank (up to 60' in diameter) is forced into an elliptical shape by compressing the section at the poles. Tank sections can be forced into elliptical sections to reduce the width for purposes of shipping over roadways. Large tank sections can be further deflected to form a near "figure 8" or dog bone shape. This additional deflection allows nesting of two or more sections to reduce shipping costs. Once on the job site, the tank sections are de-nested, de-oblated and the sections are bonded together.

Pit (Pin hole) – Small crater in the surface of a laminate with its width approximately of the same order of magnitude as its depth.

Promoter – A chemical solution, usually cobalt naphthenate, used in combination with catalyst and accelerator to control cure of resin.

Resin – In simple terms (for the fiberglass industry), resin is one component of a fiberglass structure. Initially resin is liquid than with the addition of promoters, catalyst, and reinforcements, and after a exothermic reaction becomes solid.

Resin Pocket – An apparent accumulation of excess resin in a small, localized area within the laminate.

Resin Putty – A putty-like mixture of fumed silica, milled glass fibers and resin.

Scratch – Shallow mark, groove, furrow or channel caused by improper handling or storage.

Star Cracking – A fracture in a laminate usually caused by impact and characterized by fine cracks radiating away from the center of impact.

Structural Wall – That portion of a laminate composed of filament winding or alternating layers of mat and woven roving and intended to provide structural strength.

Surface Veil A glass or synthetic veil usually used on the process side of FRP in contact with the process stream. The veil holds about 90% resin and is highly corrosion resistant. Veils most commonly used are "C" glass and Nexus.

Uni-Directional Roving – Continuous, parallel rovings held together with periodic cross strands of glass or synthetic fiber. Available in warp, weft or angled rolled goods, with a common weight of about 15 ½ oz per square yard.

Wax Coat – A resin solution, typically with a short gel time, containing paraffin wax and used as a top coat over cured laminates.

Woven Roving – Heavy fabric woven with continuous glass fiber strands. Used primarily as structural reinforcement in hand lay-up laminates.

Wrinkles – Imperfections that have the appearance of a wave molded into one or more plies of fabric or other reinforcement

Southern Company Generation

Engineering and Construction Services

Construction Services

Construction Quality Procedures

QC Procedure QC-G-06

(Revised Number: MT-CS-06)

Construction Services Survey Control

	Rev. 0	
Date	12/03/07	
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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure outlines general guidelines for proper survey layout, control, and verification on Southern Company Generation Engineering and Construction Services (E&CS) construction sites.

1.2 Scope

This procedure is an integral part of the E&CS Construction Services Quality Program. The guidelines and criteria outlined in this procedure apply to the following:

- Contractors performing survey activities on E&CS construction sites.
- Third-party survey companies performing survey activities for contractors.
- Third-party survey companies or other internal survey entities performing survey activities for Construction Services.
- Construction Services personnel as applicable from a construction management and quality oversight perspective.

2.0 DEFINTIONS AND REFERENCES

2.1 Definitions

None.

2.2 References

E&CS Basic Quality Program

Construction Services Policy and Procedure Manual, Volume 5, Construction QA Manual and Quality Control Procedures

QC-A-02, Oversight and Control of Contractor QC Programs
QC-F-01, Process Control
QC-G-01, Civil Inspection
QC-I-01, Control of Quality Records

3.0 RESPONSIBILITY

3.1 Construction Site Manager

The Construction Services construction site manager or designee shall implement and ensure adherence to the scope and requirements of this procedure.

3.2 Site Quality Lead

The Construction Services site quality lead or designee shall ensure quality preplanning, monitoring, and administration of this procedure.

3.3 Site Discipline Lead

The Construction Services site discipline leads shall ensure all entities performing survey activities on E&CS construction sites submit process procedures outlining the key components of their planned survey activities for review and acceptance.

3.4 Survey Entities

All entities performing survey activities on E&CS construction sites shall submit for review and acceptance to Construction Services process procedures outlining the key components of their planned survey activities as outlined in this procedure and procedure QC-A-02.

3.5 All Construction Personnel

Each Construction Services employee shall be responsible for the following:

- Being accountable for his or her personal safety and for the safety of others.
- Knowing the safety rules applicable to his or her work.
- Accepting personal responsibility for cooperating and complying with all Environmental Health and Safety (EH&S) policies and procedures.
- Prior to beginning work, reviewing and having a thorough understanding of all applicable safety procedures contained in the E&CS Construction Services EH&S Policies and Procedures Manual.

4.0 PROCEDURE

4.1 Establishing Baseline Survey Control – Construction Services

Construction Services or its designee shall establish initial baseline survey control for the construction site. This control may consist of previously established benchmarks that have been verified as suitable for control purposes and/or newly established control that meets the accuracy and precision criteria for the project.

To establish or restore baseline monuments or when setting temporary control monuments:

- Perform a closed-loop traverse using tripods; adjust tribrachs at each setup.
- Do not use prism poles when setting horizontal control.
- Double all angles and distances and calculate the mean. Angles shall be doubled by inverting the scope and reading Direct & Reverse (Face 1 & Face 2).
- Ensure the unadjusted closure is 1:20,000 feet, at a minimum.
- Establish the vertical control or elevations on said monuments by differential methods.
- Ensure the unadjusted level-loop closure is a minimum of the square root of the number of miles times 0.035. Use an instrument capable of achieving this level of accuracy.

If the error of closure is within the allowable criteria stated above, it is recommended that the compass rule or least squares method be used for calculating and balancing horizontal control while the proportional distance method is recommended for calculating and balancing vertical control.

4.2 Creating Temporary Survey Control – Contractors

Contractors will establish their own temporary survey control for the ongoing construction activities within their scope of work. The contractor shall establish and maintain this survey control to the accuracy and precision required to meet industry and jobsite standards and requirements. Contractors shall verify all survey control is relative and is checked against newly added or existing structures, not just against site control monuments. Contractors shall also perform routine verification of objects “laid-out” in the field to their theoretical or calculated location to ensure relative locations in the field.

When setting temporary control monuments, points or benchmarks:

- Perform a closed-loop traverse using tripods; adjust tribrachs at each setup.

- Do not use prism poles when setting horizontal control.
- Double all angles and distances and calculate the mean. Angles shall be doubled by inverting the scope and reading Direct & Reverse (Face 1 & Face 2).
- Ensure the unadjusted closure is 1:20,000 ft, at a minimum.
- Establish the vertical control or elevations on said monuments by differential methods.
- Ensure the unadjusted level-loop closure of the square root of the number of miles times 0.035 at a minimum. Use an instrument capable of achieving this level of accuracy.
- Surveys used to set temporary control monuments shall be certified by the contractor's Registered Land Surveyor (RLS) or equivalent individual.
- Set all temporary control points or temporary benchmarks and then verify them by running a closed traverse to an approved permanent site baseline control monument.
- Set all temporary control points or temporary benchmarks in a location that is not subject to disturbance and/or movement by vibrations, traffic, construction activities, and so forth.
- Field verify temporary control points/benchmarks prior to each use or if there is any evidence that the point has been disturbed.

4.2.1 Changes

Under no circumstances shall published baseline monument coordinates be changed by a contractor.

4.2.2 Verification

Construction Services reserves the right to perform independent surveys to confirm compliance to these requirements.

4.3 Survey Process Procedure

All entities performing survey activities on E&CS construction sites shall submit a survey process procedure to Construction Services that contains, at a minimum, the following components:

- Scope of the survey and/or layout being performed by the contractor.
- Identification of personnel responsible for construction layout and/or verification, including experience and qualifications.
- Identification of RLS or an equivalent individual who is responsible for certifying temporary control surveys.
- Type of instruments and equipment being used, their accuracy, methods used to verify their calibration and/or accuracy, and calibration schedule.
- Procedures and methodology used to perform the work.
- Process used to verify survey and/or layouts to ensure accuracy and limit errors.
- Relevant codes, standards, job specifications, procedures, and drawings.
- Pre-placement verification and as-built procedures.
- Process of how layout and/or verification calculations, field notes, and so forth are documented and stored in the contractor's project files.
- Process for timely notification of Construction Services for review of layout and as-built verification.

Survey entities shall submit this process procedure to Construction Services prior to the start of work with sufficient lead time to allow for review. Contractors and/or their surveyors shall not begin work until Construction Services accepts their survey process procedure.

4.4 Construction Services Verification and Oversight Activities

4.4.1 Survey Process Procedure Key Components

As part of the review process, Construction Services shall ensure, at a minimum, the process procedure sufficiently addresses the following components:

- Personnel – Do the surveyors, especially the lead surveyor, have construction layout experience? Has the RLS or equivalent individual been identified?

  Land survey experience alone is not an adequate substitute for construction layout experience. Construction Services shall determine if the survey crew leader and team have the proper experience and qualifications for the performance of construction/industrial layout/staking surveying.

- Equipment – Does the plan adequately address the type of equipment to be used on site? Is the type and accuracy of the equipment sufficient for the scope of work to be performed? Does the plan address annual calibration of the equipment?

  The equipment shall have a minimum angular tolerance of three seconds.

- Technique – Does the plan adequately address the survey process to ensure good survey practices? Are baseline survey control monuments identified and referenced to state grid and/or plant grid coordinates? Will additional temporary control be required? If yes, where will it be located? Will this temporary control allow clear and balanced lines of sight? Is there a clear understanding of how temporary control will be verified and "tied in" to existing control?

  The distance from the occupied point to the point to be staked or verified, shall be no greater than the positional tolerance of the equipment being used and the accuracy requirements of the point being staked (such as anchor bolts vs. caisson locations).

- Field layout – Does the plan specifically address how particular field layouts will be performed, such as anchor bolts, caissons, foundations, earthwork, and structural steel plumbness?

- Review of survey data – Does the plan address a process for the timely submittal of survey data and the specific type of data to be submitted to Construction Services for review? Do the proposed data reports allow a review of the survey precision and accuracy?

- Contractor document control – Does the plan address a controlled process for the storage and maintenance of survey data?

- Construction Services verification and oversight – Does the plan establish designated "hold points" so that Construction Services will be notified in a timely manner of ongoing survey activities in order to perform verification and oversight?

4.4.2 Construction Services Oversight Activities

In addition to the review and acceptance of the survey process procedure, Construction Services needs to be prepared to perform the following oversight and verification activities:

- Timely verification of contractor calculated coordinates prior to layout

- Timely verification of contractor established coordinates and control:

  – Prior to excavation.

  – After the mud slab is placed.

  - On foundations after the concrete is placed. This control shall then be used for all layout related to that foundation.

- Periodic verification of formwork, rebar, embeds, anchor bolts, as work progresses.
- Verification of caisson layout prior to caisson placement.
- Verification of as-built of caissons' locations after placement.
- Verification of equipment centerlines before equipment is set.
- Verification of structural steel plumbness.
- Verification that all survey control is relative and is checked against newly added or existing structures, not just against site control monuments.
- Routine verification of objects that are "laid-out" in the field to their theoretical or calculated location to ensure relative locations in the field.
- Periodic surveillance of contractor survey field practices to ensure good survey technique to include good instrument setup, use of secure, undamaged control monuments, and clear and balanced shots.

5.0 KEY CONTACTS

For questions regarding the content and implementation of this procedure, contact the appropriate Construction Services regional corporate quality coordinator.

6.0 QUALITY RECORDS

The various survey data transmitted to Construction Services for review shall be considered quality records and shall be stored and managed in accordance with procedure QC-I-01.

7.0 ATTACHMENTS

None.

Southern Company Generation

Engineering and Construction Services

Construction Services Quality Control Procedures

Procedure QC-H-01

Construction Services Nonconformance Report

	Rev. 4	**Rev. 5**
Date	8/9/04	10/02/07
Revised By	Robert H Reynolds, Jr	Jonathan McCarra, Robert H Reynolds
Reviewed By		
Construction Engineering Svcs	Joby B Frame	Teresa L Magnus Valerie Piazza
Approved By		
Construction	C. Ashley Baker	Keith D Russell

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure describes the proper identification, evaluation, disposition, and resolution of nonconforming items, and is an integral part of the Engineering and Construction Services (E&CS) Construction Services Quality Program.

1.2 Scope

This procedure shall be used by E&CS Construction Services personnel who perform work on E&CS Construction Services projects to identify, evaluate, and resolve nonconforming items.

This procedure applies to nonconforming items and services identified through surveillances, audits, observations or actions by personnel, or the inspection of purchased items or services.

Personnel shall use the Project Information Management System (PIMS) Nonconformance Report (NCR) to identify, dispose, and resolve all nonconforming items.

2.0 DEFINITIONS AND REFERENCES

2.1 Definitions

nonconformance – An item, system, document, method, or activity that does not comply with an approved design, technical specifications, contracts, or procedures.

reject – Replacing a nonconforming item with an item that meets the applicable requirements.

repair – Request for the item to undergo a review and evaluation by Design and other appropriate parties so it may be modified to or accepted in a condition that does not meet the original specified requirements.

rework – Making adjustments to the item in question to bring it into original design or specified condition. This is not considered a repair. "Rework" is an appropriate description for nonconforming administrative items, such as nonconforming contractor site-specific quality plans.

void – Indicates that after review and evaluation by appropriate parties, it was decided that it was not necessary to issue an NCR.

use as is – A description requiring Design evaluation, used when the recommended resolution makes no changes or modifications to the nonconforming item or circumstance listed on the NCR.

2.2 References

Design procedure D3-06, Handling Construction Nonconformance Requests

Construction Services Policy and Procedure Manual, volume 6, PIMS guideline 2B, Nonconformance Report

Construction Services Policy and Procedure Manual, volume 5, Construction QA Manual and Quality Control Procedures

QC-A-02, Oversight and Control of Contractor QC Programs
QC-H-03, Corrective and Preventive Action

3.0 RESPONSIBILITY

3.1 Construction Site Manager

The construction site manager or designee shall implement and ensure adherence to the scope and requirements of this procedure.

3.2 Site Quality Lead

The Construction Services site quality lead or designee shall ensure quality preplanning, monitoring, and administration of this procedure.

3.3 Construction Services Personnel

Construction Services personnel shall enter a description of the NCR resolution, attach relevant documents and/or pictures, and submit the resolution to site management for NCR approval and closure.

3.4 Project Engineer

The Engineering Services project engineer or designee maintains the responsibility for ensuring the timely response to all NCR reports forwarded to Design.

4.0 PROCEDURE

4.1 Nonconformance Identification

As the result of surveillances, inspections, or observations of day-to-day operations on the jobsite, there may be instances when an individual believes circumstances are contrary to an approved design, technical specifications, contracts, or procedures.

However, each situation may be unique and the guidelines regarding the issuance of an NCR (see Guidelines for Issuing a Nonconformance Report) shall be reviewed to ensure the proper identification of a nonconformance.

Guidelines for Issuing a Nonconformance Report

Proper evaluation and investigation into the potential nonconforming item should be completed to determine the need for the issuance of a Nonconformance Report (NCR). The following criteria should be evaluated by all involved parties (including E&CS construction coordinators, construction discipline and quality leads, construction site management, vendors and the appropriate designer) to determine the need for the issuance of an NCR:

- Is there a possibility of recurrence? Can recurrence be prevented?
- Will the item impact plant operability?
- Is there a safety concern? Will there be an impact on production or future work?
- Does the item require engineering or vendor evaluation?
- Does the item need to be documented?
- Will the item generate a backcharge or additional cost?

As a general guideline, if the answer to any of the above questions is yes, initiate an NCR.

Examples of items typically constituting the issuance of an NCR include:

- Damaged equipment or material.
- Fabrication errors.
- Improper storage.
- Items failing a test.
- Administrative or documentation issues.
- Improper installation.

Examples of items that may not constitute the issuance of an NCR include:

- In-process fabrication rework, such as minor weld repair revealed during visual or NDE inspections.
- Routine items found during surveillance or monitoring that may be readily corrected.

4.2 Initiation of Nonconformance Report

4.2.1 Methods

If the evaluation of the potential nonconformance results in one or more of the afore mentioned criteria being met, an NCR should be initiated. An NCR may be initiated through Southern Company or through the contractor/vendor.

- Southern Company Generation employee initiates/generates an NCR using PIMS. (See PIMS guideline 2B, Nonconformance Report).

- In cases when a contractor/vendor identifies a nonconforming item, the contractor/vendor shall notify Construction Services personnel and/or initiate a written NCR per the contractor's approved nonconformance procedure. If the contractor's written NCR contains information applicable for distribution and tracking purposes, the site quality lead, Construction discipline lead, or designees shall ensure the NCR is scanned in as an attachment to a new PIMS-generated NCR.

4.2.2 Evaluation and Resolution Recommendation

Site management personnel shall evaluate the nonconformance, determine a recommended resolution, and determine the need for engineering evaluation of the nonconforming item. Supporting documentation and/or photographs shall be attached to the NCR.

NOTE
For future analysis and tracking, it is imperative the appropriate reason code is selected from the PIMS drop-down menu. This activity is completed as a step in the stage 2 process and is the responsibility of the designated Construction Services personnel.

4.3 Notification of Nonconformance

All affected parties shall be notified of a nonconformance report by using the e-mail notification list on the NCR report. This includes all affected contractors/vendors, E&CS Construction Discipline Leads, E&CS Construction Site Quality Lead, E&CS Construction Coordinators, E&CS site management and the project Engineer. If a contractor is affected by the NCR report and does not have PIMS access, the NCR should be printed from PIMS and transmitted to the appropriate contractor. As a minimum, the following shall be notified via the PIMS E-mail distribution list each time an NCR is initiated:

- E&CS site construction manager or designee.
- E&CS site quality lead or designee.

4.3.1 Engineering Notification

During the initial evaluation of the nonconformance, E&CS construction personnel determine the need for engineering evaluation of the nonconforming item (see 4.2.2, Evaluation and Resolution Recommendation). If Construction Services determines a need for engineering evaluation, it shall seek evaluation from the responsible engineer.

If a nonconforming item does not comply with an approved design drawing, design plan, or technical specification, the responsible engineer shall evaluate the nonconformance as detailed below.

Engineering evaluation shall be required for the following recommendations-from-site-for-resolution (see stage 2 of the NCR form):

- Repair.
- Use as is.

1. Mark the Engineering Approval Required selection box, found in stage 2 of the PIMS Nonconformance Report, “Yes”.

2. Select the appropriate E&CS Design engineer.

3. Notify the E&CS project engineer.

For informational purposes, it is recommended that engineering be notified for the following “Recommendations from Site for Resolution”:

- Rework.
- Reject.
- Void.

4.4 Resolution of Nonconformance

Depending on the nature of the nonconformance, the NCR may either be resolved onsite with the final closeout being preformed by site management, or may be sent to Design for resolution and/or comment.

4.4.1 Design Resolution

The site quality lead, construction discipline lead, or representative will initiate an NCR using the PIMS Form Center database and monitor it through completion. If the NCR requires Design approval as noted above, forward the report to the appropriate engineer (include the details and all supporting documents). This will ensure the NCR is completed correctly, appropriate documents are attached, and appropriate distribution and transmittals are made.

When an NCR is forwarded to Design, the appropriate project engineer will supply the site with a detailed response and/or comment on how the report should be resolved. (See D3-06, Handling Construction Nonconformance Requests.)

When an NCR is resolved, Construction Services personnel shall enter a description of the resolution, attach relevant documents and/or pictures, and submit the resolution to site management for approval and closure.

4.4.2 Onsite Resolution

Site management shall be responsible for monitoring all NCRs and submitting recommendations from the site. If the NCR can be closed out from the site without having Design input, the site management will close out the NCR report.

When an NCR is resolved, site management shall review the description of the resolution as well as any relevant documents and/or pictures, and upon approval closes out the NCR.

4.5 Distribution of the NCR

Documentation on NCRs is essential for maintaining the integrity of E&CS work. Appropriate reference shall be established through one of the following:

- Attach a copy of the NCR to the relevant drawings and/or specifications referenced on the NCR.
- Stamp the affected drawings with the NCR number.

The completed NCR shall remain a part of the drawing(s)/specification(s) until a revision that contains the information referenced in the NCR is issued. If appropriate, a copy of the completed NCR should be included in referenced files or related documents.

If the contractor does not have access to PIMS, then the NCR should be printed from the database and transmitted to the contractor via a signed transmittal letter.

4.6 Status and Tracking Reports

PIMS provides various status reports. The reports generally fall into two categories: auto-generated reports and on-demand reports. See PIMS guideline 1-D, General User Guideline for instructions on running these reports.

5.0 KEY CONTACTS

For questions regarding the content and implementation of this procedure, contact the appropriate Construction Services regional corporate quality coordinator.

6.0 QUALITY RECORDS

Documents generated as a result of the NCR process shall be processed in accordance with procedure QC-I-01, Control of Quality Records.

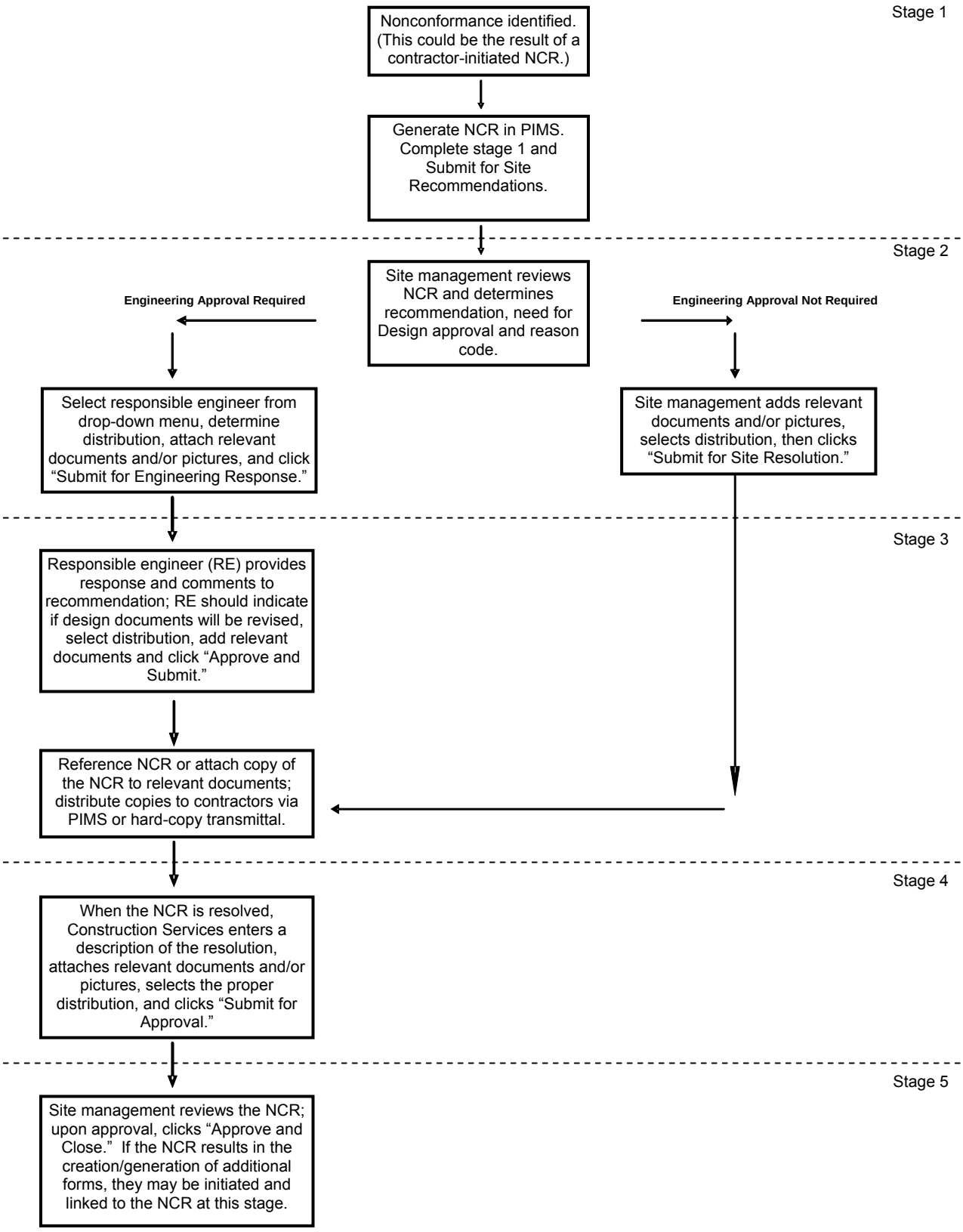
7.0 ATTACHMENTS

Attachment A, Nonconformance Process Flowchart

Attachment B, Sample Nonconformance Report

Attachment C, Historical Summary of Changes

Attachment A – Nonconformance Report Flowchart



Attachment B – Sample Nonconformance Report
(1 of 3)

Project:	Plant:	Generating Unit:
PIMS Demo Project	Demo Plant	
NCR Number: 59	Resolution Due Date	
Contractor:	Discipline No.: Test	

Affected Design Documents

Document No.	Sheet No.	Rev No.

Description of Nonconformance:
Test

Initiated By:	Initiated Date:
Reynolds, Robert H., Jr.	

Submitted By

Reynolds, Robert H., Jr. - Construction Discipline Lead

10/2/2006 9:49 AM

Notified

Recommendations from Site for Resolution

Recommendations:

Root Cause:

Engineering Approval Required?:	Approved By	Date:	Name of Responsible Engineer
	Reynolds, Robert H., Jr.		

Submitted By

Attachment B – Sample Nonconformance Report
(2 of 3)

Reynolds, Robert H., Jr. - Construction Discipline Lead
10/2/2006 9:51 AM
Notified

Response from Responsible Engineer	
Your request for the above:	
Exceptions/Clarifications	
Design Document(s) Will Be Revised:	
Responsible Engineer	Date:

Submitted By
Reynolds, Robert H., Jr. - Construction Discipline Lead
10/2/2006 12:53 PM
Notified

NCR Resolution	
Description of How Nonconformance Was Resolved Test	
Backcharge	Contractor's Representative:
Corrective Action Verified By: Reynolds, Robert H., Jr.	Verified Date:

Submitted By
Reynolds, Robert H., Jr. - Construction Discipline Lead
10/2/2006 12:57 PM

Attachment B – Sample Nonconformance Report
(3 of 3)

Notified

NCR Approval	
Approved by SCGEM - E&CS Site Mgmt: Reynolds, Robert H., Jr.	Approved Date:

BCA: New RFI: New FWA: New FCR: New CCF: New DCN: New VDR: New OCR: New

Print

Attachment C – Historical Summary of Changes

Rev. 0
01/06/00
Approved by Robert W McManus
Reviewed by David M Crawley
Revised by Robert H Reynolds, Jr

Remarks:
Issued

Rev. 1
03/06/00
Approved by Robert W McManus
Reviewed by David M Crawley
Revised by Robert H Reynolds, Jr

Remarks:
General revision, including renumbering to fit QA Program format

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Rev. 2
03/26/02
Approved by Joby B Frame
Reviewed by W C Lyon
Revised by Robert H Reynolds, Jr

Remarks:
General revision, including department name change

Rev. 3
10/14/02
Approved by John C Huggins
Reviewed by W Dexter Presley
Revised by Robert H Reynolds, Jr

Remarks:
Department name change; addition of NCR process flowchart; update attachments

---

Rev. 4
08/09/04
Approved by C Ashley Baker
Reviewed by Joby B Frame
Revised by Robert H Reynolds, Jr

Remarks:
Incorporation of best practices by administrative QC Review Committee: E Boerner, C Casey, T Duncan, and S Lumsden.

Rev. 5
10/02/07
Approved by Keith Russell
Reviewed by Teresa Magnus
Revised by Jonathan McCarra and Robert H Reynolds, Jr

Remarks:
Editorial changes – standardize format to comply with Project Controls documentation and update based on current construction practices. Added clarifying language throughout.

SCGEM Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – H – 02)

Hold Tag Procedure

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	4/3/00
0	Issued for Construction	*RHR, Jr.*	*DMC*	*RWM*	7/7/00
1	Department name change; editorial changes and clarifications; update to Attachment A	*RHR, Jr.*	*RER*	*JCH*	12/10/02
2	Incorporation of Best Practices by Administrative QC Review Committee: E. Boerner, C. Casey, T. Duncan and S. Lumsden	*RHR, Jr.*	*JBF*	*A. Baker*	8/9/04

QC – H - 02
Hold Tag Procedure

Purpose

The purpose of this procedure is to outline the general guidelines for the use of hold tags on SCGEM Engineering and Construction Services **(E&CS)** construction projects. This procedure will outline basic requirements for the issue, tracking and removal of hold tags on items received and used at these projects.

Scope

This procedure is an integral part of the SCGEM **E&CS** Construction Services construction Quality Assurance Program**.** This Hold Tag procedure is for use on SCGEM **E&CS** Construction Services construction projects only and is not intended for use by Operating Plant personnel. Every effort will be made to insure that the hold tag referenced in this procedure can be easily distinguished from hold tags issued by the Operating Plant. The Hold Tag referenced in this procedure shall have the words "SCGEM Engineering and Construction Services" plainly typed on the Hold Tag. In addition, the Hold Tag shall be printed on yellow paper to distinguish it from the red Operating Plant hold tag. Refer to Attachment A for an example.

Generally, a Hold Tag will be used to isolate nonconforming items or items with incomplete inspections from construction use until such time as the nonconformance has been resolved or the inspection has been completed.

Responsibility

It will be the sole responsibility of SCGEM **E&CS** Construction Services personnel to control the use of the hold tag referenced in this procedure.

Hold Tag Criteria

A Hold Tag similar to Attachment A should be used to isolate items from construction use. Generally, Hold Tags will be issued as part of the initial receipt inspection performed as part of procedure QC – D – 01 on Receipt, Storage and Handling of Products. However, a Hold Tag may be issued at any time that there is a need to isolate an item. For nonconformance items, a nonconformance report (reference procedure QC – H – 01) shall be issued prior to initiating a Hold Tag.

Hold tags may be issued to isolate items that have been placed on "Hold" pending receipt of documentation or final inspection.

Hold Tag Process

Once the decision has been made that a Hold Tag needs to be issued, the following processes shall be followed:

Nonconformances:

1) Issue a nonconformance report (NCR) per QC – H - 01.

2) Issue the Hold Tag using the next available sequence number and fill out the Hold Tag log (reference Attachment B). Be sure to reference the NCR number on the Hold Tag.

3) Fill out the Hold Tag (reference Attachment A), make a copy of the Hold Tag and file the copy with the log.

4) Attach the Hold Tag to the item in nonconformance.

5) Once the nonconformance has been resolved and the NCR has been closed, the Hold Tag shall be removed and filed with the log. The Hold Tag shall not be removed until the NCR has been resolved.

6) The Hold Tag log shall be updated to reflect the resolution of the Hold Tag.

Incomplete Documentation or Inspections:

1) Issue the Hold Tag using the next available sequence number and fill out the Hold Tag log (reference Attachment B). "N/A" the reference to the NCR number.

2) Fill out the Hold Tag (reference Attachment A), make a copy of the Hold Tag and file the copy with the log.

3) Attach the Hold Tag to the affected item(s).

4) Once the documentation has been received and/or the inspection satisfactorily completed, the Hold Tag shall be removed and filed with the log.

5) The Hold Tag log shall be updated to reflect the resolution of the Hold Tag.

Hold Tag Log

The Hold Tag log shall be maintained on site. It shall be the responsibility of on site SCGEM **E&CS** Construction Services personnel to insure that this log is properly maintained. The following numbered items pertain to particular sections of the sample Hold Tag log (Attachment B).

1) **Hold Tag Number** – sequential numbering of the hold tag.

2) **Date of Issue** – date hold tag is issued.

3) **Initiator** – Person who initiates the hold tag.

4) **NCR Number** – number of the nonconformance report that documents the reason for the hold tag (reference QC – H – 01). This shall be marked "N/A" if the hold tag is issued for reasons other than a NCR.

5) **Reason Hold Tag Was Issued** – a short description of why the Hold Tag was issued.

6) **Resolution** – brief description of why the hold tag was removed.

7) **Hold Tag Removed By** – authorized person who removed the hold tag.

8) **Date Removed** – date hold tag was removed.

The Hold Tag Status log must be completed for each hold tag issued. A hold tag will not be considered closed until all the information on the status log has been completed.

Document Control

The Hold Tag status log and the original Hold Tags shall be filed and maintained throughout the construction process. At the completion of the construction project, this documentation shall be processed in accordance with procedure QC – I – 01: Control of Quality Records.

SCGEM Engineering and Construction Services – Hold Tag

HOLD – DO NOT USE

Hold Tag No. _____ **Date:** _____

NCR Number (if applicable): _____

Reason for Hold Tag: _____

_____

Initiator: _____

SAMPLE

Attachment A

Hold Tag Status Log

Hold Tag Number	Date of Issue	Initiator	NCR Number (If Applicable)	Reason Hold Tag Was Issued	Resolution	Hold Tag Removed By	Date Removed
1	2	3	4	5	6	7	8
				SAMPLE			

SC**GEM Engineering and Construction Services**

Construction Quality Control Procedures

QC Procedure Number (QC – H – 03)

Corrective and Preventive Action

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	04/13/00
0	Issued for Construction	*RHR, Jr.*	*DMC*	*RWM*	5/30/00
1	Department name change; editorial changes and clarifications	*RHR, Jr.*	*KDR*	*John C. Huggins*	12/16/02

QC – H - 03
Corrective and Preventive Action

Purpose

The purpose of this procedure is to outline the corrective or preventive action that will be taken to minimize the reoccurrence of actual or potential nonconformities on **SCGEM Engineering and Construction Services construction** projects. This procedure will summarize the controls that are in place to identify and prevent a nonconformance and the steps taken to correct the nonconformance and ensure that the nonconformance does not reoccur.

Scope

This procedure is an integral part of the **SCGEM Engineering and Construction Services construction** Quality Assurance Program and is intended for use on **SCGEM Engineering and Construction Services construction** projects.

Responsibility

It will be the sole responsibility of **SCGEM Engineering and Construction Services** personnel and their designees to implement and control the use of this procedure.

Controls

Controls are in place for documenting and analyzing the causes of nonconforming items or situations. Based on the particular situation, a nonconformance report (reference QC – H – 01) and a Hold Tag (reference QC – H – 02) **may** be issued. Part of the nonconformance and hold tag process is the documentation of the recommended resolution to the nonconformance and a description of how the nonconformance was finally resolved. A NCR and hold tag status log shall be periodically distributed to all interested and involved parties for review and analysis. **The DCN/FCR/NCR database may also be used to analyze and distribute this information**.

In a similar manner, a Field Change/Clarification Request procedure (reference QC – B – 02) is in place for requesting clarifications and/or changes from **SCGEM Engineering and Construction Services – Fossil and Hydro** Engineering for drawings and specifications issued to the field. A FCR status log is periodically distributed to all interested and involved parties for review and analysis. **The DCN/FCR/NCR database may also be used to analyze and distribute this information.**

Weekly update meetings with follow-up "breakout" meetings shall be held on site with all involved parties to discuss construction progress and issues. At the conclusion of significant milestones, one or more "lessons learned" meetings shall be held to discuss lessons learned from the work just completed and how issues encountered can be prevented in the future. Detailed minutes of these meetings shall be taken and distributed to appropriate individuals. Individuals involved in these meetings shall be from **SCGEM Engineering and Construction Services** and other organizations such as **SCGEM E&CS Fossil and Hydro Engineering**, contractors and Plant personnel as appropriate.

Reports and test results shall be analyzed as appropriate to identify trends that could lead to a nonconforming situation. For example, the monitoring of concrete test results to ensure that concrete strengths, slump and air content tests are tracking consistently.

Identification of Trends

Periodically, appropriate test results and the NCR, FCR and Hold Tag status logs **and/or databases** shall be reviewed and analyzed for potential trends. These trends may be of actual nonconformances already documented or events that may lead to a nonconformance if not addressed. For more accurate identification of potential trends, the largest sample size possible shall be used. Where possible, this should include a review of the entire status log, **database** or all test results related to a particular activity or scope of work.

Examples of potential trends are as follows:

- multiple deficiencies on a single activity; i.e. welding errors
- high number of deficiencies by a single contractor compared to total work scope
- high number of deficiencies for a particular scope of work (i.e. concrete, fabrication errors, etc.)
- declining test results or fluctuating test results indicating a potential lack of control and consistency. (For example, concrete batch plant operations or soil compaction operations.)

Analysis of Potential Trends

Once a potential trend has been identified, the following process shall be implemented:

- Based on available data, determine if a trend truly exists or whether the nonconformance(s) were merely abnormalities that have already been corrected.
- If a trend does exist, it should be brought to the attention of **SCGEM Engineering and Construction Services** management and first line supervision.
- The root cause of the nonconforming trend shall be identified.
- A determination shall be made as to the benefits of pursuing corrective action of the root cause based on the significance of the nonconforming trend compared to job status.
- Work with management and others to prevent a reoccurrence of the nonconforming trends by appropriate training, proper notifications, clarifications, etc.

Southern Company Generation

Engineering and Construction Services

Construction Services

Construction Quality Control Procedures

QC Procedure Number (QC – I – 01)

Control of Quality Records

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	9/7/00
0	Issued for Construction	*RHR, Jr.*	*DMC*	*RWM*	12/18/00
1	Department name change; updated reference to the Southern Company retention schedule; removed examples	*RHR, Jr.*	*TED*	*JCH*	12/10/02
2	Incorporation of Best Practices by Administrative QC Review Committee: E. Boerner, C. Casey, T. Duncan and S. Lumsden	*RHR, Jr.*	*JBF*	*A. Baker*	8/9/04
3	Revised to reflect changes to SOCO Retention Schedule and current construction practices	*RHR, Jr.*	*JBF*	*DLM*	4/17/06

QC – I - 01
Control of Quality Records

Purpose

The purpose of this procedure is to outline the general guidelines necessary to assure that appropriate construction records are maintained and stored in a controlled manner during and after the construction process.

Scope

This procedure will outline the basic process for maintaining and storing appropriate records generated during construction on Engineering and Construction Services (E&CS) construction projects.

This procedure is an integral part of the E&CS Construction Services Quality Assurance Program.

Responsibility

Generally, it will be the responsibility of E&CS Construction Services personnel and their designees to ensure that the appropriate records are maintained and stored in a controlled manner.

Records transfer procedures shall be obtained from the appropriate contact in the Records Management Department. The appropriate contact shall be determined based on the location of the construction project and the intended records storage location.

Reference Documents

Southern Company Records Retention Schedule

E&CS Construction Services Policy and Procedure Manual Volume 5 – Construction QA Program and QC Procedures

E&CS Construction Services Policy and Procedure Manual Volume 6 – PIMS Procedure Manual

Records

Records shall be stored on the jobsite during construction in a manner that allows for safe and secure storage and convenient retrieval. At the completion of the construction project, appropriate personnel from E&CS Construction Services will decide which records need to be maintained and stored and which records can be discarded.

At the start of a construction project, consideration shall be given to the eventual storage of records. If electronic storage is anticipated, paper documents may need to be scanned on a routine basis in order to prevent a backlog at the completion of the project. If the construction project involves multiple units, it may be desirable to go through a records retention process at the completion of each unit. This will help preserve the integrity of records by preventing the combination of records from different units. This process may also be desirable when records storage space is critical. These advantages must be weighted against the ability for rapid record retrieval if the records **were to** remain on site throughout the construction project.

Generally, records should be stored and maintained in at least one of the following four locations:

Document Control – All hard copy quality documents should be housed in the onsite Document Control Center. The on site Document Control Center shall be the single repository for all hard copy documents and associated transmittals, databases and spreadsheets. Quality documents shall not be housed in individual files that are not maintained by Document Control.

Project Information Management System (PIMS) – PIMS shall be used as the main source for the transfer of information between all parties involved in the construction process to include vendors, contractors, Construction Services personnel and Design Engineering personnel. Documents generated in PIMS shall be stored and maintained in PIMS along with all associated correspondence. The use of email for the transfer of important documentation and correspondence shall be discouraged in favor of the PIMS system. Refer to the PIMS Procedure Manual for further information on the use of this system.

Site Specific Shared (S) Drive and Folders – The use of a site specific shared drive or shared folders is a recommended method for the updating and sharing of dynamic, ever changing data (such as spreadsheets that are updated daily). This type of data should be updated and posted to PIMS on a regular basis. Quality documents shall not be stored on individual "C" or hard drives.

Field Office – All hard copy administrative/commercial documents not stored in Document Control shall be housed and maintained in the Field Office. Generally , these documents are classified as "Construction Administrative Records" and consist of invoices, purchase orders, time sheets and other similar documents.

At the completion of the construction project, documents that originated in other departments (purchase orders, drawings and specifications) shall be maintained and controlled by that originating department. Copies of documents that are being maintained for reference only need not be maintained and may be destroyed.

Care shall be taken in the disposal of documents that contain confidential and/or propriety information to insure that these documents are properly shredded or otherwise destroyed.

A meeting shall be held with all involved parties (Engineering, Plant Operations, Supply Chain Management, etc.) to discuss the disposition of construction records. A matrix similar to Attachment A should be developed in order to insure records are transferred to the appropriate parties at the completion of the construction project.

Retention

The length of retention for construction related documents that will be stored shall be based on the Southern Company Retention Schedule. This is a schedule maintained by the Records Management Department.

The current copy of the retention schedule is available on the Southern Company intranet at the following address:

http://powergeneration.southernco.com/depts/engineering/es-doc-svcs/SoCoRecRetentionSch.doc

This schedule shall be referenced when determining specific retention schedules for specific construction documents.

Generally records that will need to be retained shall be divided into four categories based on the SOCO records retention schedule. These four categories are defined as follows:

Site Data – Geotechnical/Geological/Ecological

This data shall consist of such documents as soil/rock test results, caisson logs, drill logs and other geological, geotechnical, seismic, and environmental data. A more detailed list can be found in Section D&E.05.001 in the Records Retention Schedule. This type of record shall be retained permanently.

Construction Quality Records

These are records generated during the course of a construction project that document the ongoing process of achieving a quality end product. Examples of documents in this category include, but are not limited to, change control documents such as FCRs, NCRs and RFIs, construction inspection reports, photos and checklists, test results, signed turnover packages and releases (if not maintained by others), welding procedures, and inspector and welder qualifications/certifications. This should include all related databases and spreadsheets that support these documents. A more detailed list can be found in Section D&E06.001 in the Records Retention Schedule. This type of record shall be retained for Life of Plant plus 6 years.

Construction Administrative Records

These are records generated during the course of a construction project that document the ongoing administrative activities associated with the construction project. Safety documents generated during the course of construction will be stored in accordance with this section except as noted in the following section. Examples of documents in this category include, but are not limited to, bid documents, contractor construction schedules, drawing transmittals and databases, miscellaneous transmittals, general correspondence, invoices, letters to contractors, field work authorizations, back charge authorizations, time sheets, purchasing card statements, contracts (if not maintained by others), and weekly and monthly progress reports and photos. A more detailed list can be found in Section D&E06.002 in the Records Retention Schedule. This type of record shall be retained until the completion of the construction project plus 6 years.

Safety Incident and Accident Records

Safety incident investigations and vehicle accident reports shall be retained in accordance with sections RSK.01.010 and section RSK.01.013 of the SOCO Retention Schedule. This type of record shall be retained for the current year plus 7 years.

Refer to Attachment B for a list of activities associated with the records retention process.

Storage

Generally, unless electronic storage of records has been considered, records will be sent to Records Management for long term storage. It will be the responsibility of E&CS Construction Services to maintain the listing of records that have been sent to Records Management. Copies of this master list shall be sent to the **appropriate Regional Corporate** QC Coordinator, the plant and other interested parties.

The records storage process shall be controlled by the records transfer procedures obtained from Records Management. To allow for proper retrieval of information, consideration shall be given to the proper labeling of boxes. Boxes shall be labeled with sufficient detail to allow the retrieval of individual boxes based on the retrieval request. Prior to the labeling of all boxes, a logical systematic labeling process shall be developed by the appropriate onsite Construction Services personnel. Refer to Attachment A for examples.

Control of Quality Records
Demobilizatin Matrix - Examples

Document Description	Disposition Store/Transfer/Destroy	Recipient of Stored Items	Type of Record	Records Retention Category	Length of Storage	Comments
3rd Party Inspection Reports and/or CDs	Store	Records Management	Quality	D&E 06.001	LP + 6 years	
Bid Packages	Store	Records Management	Administative	D&E 06.002	CL + 6 years	If not retained by SCM, Engineering or others
Contracts	Store	Records Management	Administative	D&E 06.002	CL + 6 years	If not retained by SCM or others
Contractor Performance Reviews	Transfer	Supply Chain Mgmt. database / Corporate QC Coordinator	Administative	D&E 06.002	CL + 6 years	
Contractor RFI's and Logs	Store	Records Management	Quality	D&E 06.001	LP + 6 years	
Contractor Schedules and CDs	Store	Records Management	Administative	D&E 06.002	CL + 6 years	
Copies of Documents (drawings, etc.)	Destroy/Recycle	N/A			N/A	
Daily Inspection Reports	Store	Records Management	Quality	D&E 06.001	LP+ 6 years	
Daily Outage Reports	Store	Records Management	Quality	D&E 06.001	LP + 6 years	
DCN, FCR, NCR database forms and logs (PIMS data)	Store	Records Management / PIMS	Quality	D&E 06.001	LP + 6 years	
Document Control Vendor and Domestic Drawing Transmittals	Store	Records Management	Administative	D&E 06.002	CL + 6 years	
Drawing and Misc. Transmittal Records (CD)	Store	Records Management	Administative	D&E 06.002	CL + 6 years	
Drawing Logs	Store	Records Management	Administative	D&E 06.002	CL + 6 years	
FWA's	Store	Records Management / PIMS	Administative	D&E 06.002	CL + 6 years	
General Correspondence	Store	Records Management	Administative	D&E 06.002	CL + 6 years	
Invoices	Store	Records Management	Administative	D&E 06.002	CL + 6 years	
Letters to Contractors	Store	Records Management	Administative	D&E 06.002	CL + 6 years	
Manuals - Operation and Maintenance	Transfer	Plant Operations	Quality	D&E 06.001	LP + 6 years	If not transferred to the Plant
Procurement Card Records	Store	Records Management	Administative	D&E 06.002	CL + 6 years	
Quality Control Records: Concrete Breaks, Pour Cards, Mill Test Reports, Soil Tests, Grout Submittals, Concrete Mixes, Inspection Reports	Store	Records Management	Quality	D&E 06.001	LP + 6 years	
Drill Logs, Caisson Logs, Piling Logs, Subsurface Investigations	Store	Records Management	Site Data	D&E 05.001	Permanent	If not transferred to Design Engineering or others
Safety Incident and Accident Reports	Store	Records Management	Safety	RSK.01.010 RSK.01.013	CY + 7 years	
Signed Turnover Packages and Release Forms	Transfer	Plant Operations	Quality	D&E 06.001	LP + 6 years	If not transferred to the Plant
Timesheets	Store	Records Management	Administative	D&E 06.002	CL + 6 years	
Weekly and Monthly Progress Reports	Store	Records Management	Administative	D&E 06.002	CL + 6 years	
Weld Procedures and Certs.	Store	Records Management	Quality	D&E 06.001	LP + 6 years	
LP = life of plant plus 6 years CL = close of construction project + 6 years CY = current year + 7 years						

Attachment A

Records Retention/Demob Checklist

- ☐ Review QC procedure QC-I-01 Control of Quality Records
- ☐ Review **Records Management** transfer procedures
- ☐ Review appropriate sections of the Records Retention Schedule for required length of retention
- ☐ Develop logical systematic labeling process for all boxes to allow for easy document retrieval
- ☐ Transfer appropriate documents to Plant Operations
- ☐ Transfer appropriate documents to Engineering
- ☐ Burn a CD of appropriate electronic records **if not stored elsewhere**
- ☐ Copies of drawings do not need to be shredded; they can be recycled.
- ☐ Purchasing card records can be stored in off site storage along with other project records.
- ☐ Send a copy of the completed records transfer list to the **appropriate regional Corporate Quality Coordinator**
- ☐ Consider using Document Services to scan and store records in Documentum; contact Anne Lugar at 8-992-7710
- ☐ Use **"PIMS"** for records retention and data storage as appropriate

Attachment B

SC**GEM Engineering and Construction Services**

Construction Quality Control Procedures

QC Procedure Number (QC – I – 02)

Training

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	3/13/00
0	Issued for Construction	*RHR, Jr.*	*DMC*	*RWM*	4/13/00
1	Department name change; editorial changes; remove outdated attachments	*RHR, Jr.*	*RRH*	*John C. Huggins*	12/10/02

QC – I - 02
Training

Purpose

The purpose of this procedure is to outline the general guidelines necessary for identifying training needs and for providing training for all **SCGEM Engineering and Construction Services construction** employees performing activities affecting quality.

Scope

This procedure will address the general process of ensuring that **SCGEM Engineering and Construction Services construction** employees receive the training necessary to perform and/or inspect quality activities. This training will include, but not be limited to, company sponsored training, on site training, vendor training, safety training, seminars and conferences. All personnel will receive training on the **SCGEM Engineering and Construction Services Construction** QA Program.

This procedure is an integral part of the **SCGEM Engineering and Construction Services Construction** Quality Assurance Program**.**

Responsibility

The identification of training needs and the completion of appropriate training will be the responsibility of all employees working in **SCGEM Engineering and Construction Services**. Coordination and consolidation of **construction** training needs along with the tracking of completed training will be the responsibility of the **construction QC Coordinator**. Oversight will be provided by the **SCGEM Engineering and Construction Services** management team. The management team will ensure that personnel have the technical capability and **skill sets necessary** to perform the required quality tasks and **to manage a quality project**.

Identification of Training Needs

SCGEM Engineering and Construction Services will perform ongoing training need assessments using surveys, employee input, job requirements and management input as a basis for determining necessary training. Appropriate training will be arranged using the input from these assessments. There will also be periodic reviews comparing job requirements against current personnel skills. Training will be scheduled based on the results of these reviews.

Training Records

Training records will be maintained in the Southern Human Resources Information and Payroll System (SHIPS). Reports will be generated from this system for management and employee use on an as-needed basis. **Employees may access their own training records through Peoplenet via the SOFI Home Page. Within PeopleNet, employees should click on "Employee Data" and then click on "View Your Training Summary".**

SC**GEM Engineering and Construction Services**

Construction Quality Control Procedures

QC Procedure Number (QC – I – 03)

Statistical Techniques

Revision	Description	Revised By	Reviewed By	Approved By	Date
A	Issued for Review	N/A	N/A	N/A	8/21/00
0	Issued for Construction	*RHR, Jr.*	*DMC*	*RWM*	12/18/00
1	Department name change; editorial changes	*RHR, Jr.*	*RLR*	*John C. Huggins*	12/10/02

QC – I - 03
Statistical Techniques

Purpose

The purpose of this procedure is to outline the general guidelines necessary to assure that statistical techniques are used as appropriate to monitor and evaluate the quality of activities performed on **SCGEM Engineering and Construction Services construction** projects. Examples of techniques that **could possibly** lend themselves to such activities are:

- the evaluation of concrete strength test results
- the evaluation of compacted soil test results
- the evaluation of soil moisture content test correlations
- the evaluation of torque and tension correlations for high strength bolting

Scope

This procedure will cover the basic process for obtaining the test data necessary to properly use statistical techniques for the evaluation of the activities referenced above. **As** specific techniques **are identified, they will be** described **and included** as attachments to this procedure.

This procedure is an integral part of the **SCGEM Engineering and Construction Services construction** Quality Assurance Program**.**

Responsibility

Generally, it will be the responsibility of the contractors employed by **SCGEM Engineering and Construction Services** to ensure that test data is submitted in a timely manner to **SCGEM Engineering and Construction Services** personnel for analysis. This data may be submitted by the contractor or by the subcontractor or testing agency supplying the service for the contractor.

SCGEM Engineering and Construction Services reserves the right to perform whatever inspections and tests are deemed necessary to insure quality workmanship and conformance to project specifications, procedures and drawings.

Analysis and interpretation of the data submitted will be the responsibility of **SCGEM Engineering and Construction Services and/or their designee**.

Data

All data submitted for analysis shall be obtained and tested in accordance with applicable codes and standards. Data submitted for analysis **should** be obtained from a random sampling process that ensures that the data is not biased. The larger the sample size submitted, the more meaningful will be the results. Test results **should** be submitted to **SCGEM Engineering and Construction Services** in a timely manner. The types of data that will need to be submitted will be outlined within each specific attached application.

Analysis

The test data submitted will be analyzed using statistical techniques to determine such factors as:

- test uniformity
- mix design strength requirements
- compaction test requirements
- correlation factors

The results from the statistical evaluation will be used to:

- verify that proposed concrete mixes meet job site and ACI requirements
- identify trends that, if left unattended, may lead to unsatisfactory results
- identify uniformity and consistency issues that need to be addressed
- ensure that correlations are valid

Document Control

The results of these evaluations **should** be maintained throughout the construction process and **should** become part of the permanent records upon completion of the project. **These records should be processed in accordance with procedure QC-I-01: Control of Quality Records**.

Evaluation of Strength Test Results of Concrete

Purpose

The purpose of this attachment is to outline the general guidelines necessary to assure that statistical techniques are used as appropriate to monitor and evaluate the quality of concrete activities performed on **SCGEM Engineering and Construction Services construction** projects.

Scope

This attachment will cover the use of statistical techniques for the evaluation of concrete strengths as outlined in ACI 214 and as summarized in ACI 318, ASTM C 94 and/or job site specifications.

This attachment is an integral part of procedure QC – I - 03 Statistical Techniques.

Responsibility

Generally, it will be the responsibility of the contractors employed by **SCGEM Engineering and Construction Services** to ensure that test data is submitted in a timely manner to **SCGEM Engineering and Construction Services** personnel for analysis. This data may be submitted by the contractor or by the subcontractor or testing agency supplying the service for the contractor.

SCGEM Engineering and Construction Services reserves the right to perform whatever inspections and tests are deemed necessary to insure quality workmanship and conformance to project specifications, procedures and drawings.

Analysis and interpretation of the data submitted will be the responsibility of **SCGEM Engineering and Construction Services and/or their designee**.

Data

All data submitted for analysis shall be obtained and tested in accordance with applicable ASTM standards. All proposed concrete mixes **should** be submitted to **SCGEM Engineering and Construction Services** for review and approval prior to use. The proposed mixes **should** include a concrete strength break history as specified in ACI 214, ACI 318 and ASTM C 94 and **should** contain acceptable test results and/or certificates of conformance on all ingredients that will be used in the particular concrete mixes. The proposed mixes **should** also meet all design requirements as specified in job site specifications and drawings.

Concrete test results **should** be submitted to **SCGEM Engineering and Construction Services** in a timely manner. All test results shall reference the particular mix designation, strength requirements and the date the tests were performed. The results of the following tests shall be submitted:

- slump
- air content
- concrete temperature
- unit weight (when applicable)
- individual cylinder breaks at the ages specified in the job site specifications (generally at 7 and 28 days)

Reporting and Analysis

Concrete test results **should** be recorded on a spreadsheet similar to the attached. This spreadsheet can be used:

- to verify that proposed mixes meet the job site strength requirements.
- to verify that proposed mixes meet the overdesign requirements of ACI 214, ACI 318 and ASTM C94.
- for early detection of potential 28 day concrete strength problems.
- to monitor the uniformity of the concrete.

CONCRETE CYLINDER BREAKS
4000 PSI MIX - MIX #13

Pour Description	DATE MADE	7 DAY BREAKS DUE	28 DAY BREAKS DUE	AIR CONTENT	SLUMP INCHES	7 DAYS			28 DAYS				PLANT	Average Last 30 Tests	STD. DEV.	7 Day Strength As % of 28 Days
						A	B	Average	A	B	C	Average				
Sump 3 Fdn	2-Aug-00	9-Aug-00	30-Aug-00	4.20	4.00	3240	3140	**3190**	4630	4490	4500	**4540**	Milledgeville	4540		70%
Sump 4 Fdn	3-Aug-00	10-Aug-00	31-Aug-00	4.00	3.50	3170	3150	**3160**	4530	4500	4490	**4507**	Milledgeville	4523	24	70%
		7-Jan-00	28-Jan-00													
		7-Jan-00	28-Jan-00													
		7-Jan-00	28-Jan-00													
		7-Jan-00	28-Jan-00													
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