

Ownership matrix	USQ #GCX-2
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1.0 PURPOSE AND SCOPE

(7.1.2)

This procedure establishes the Tank Operation Contractor's (TOC) process for preparing, checking, reviewing, and approving calculations, as well as accepting calculations by outside contractors and suppliers submitted via the Vendor Processes procedure (TFC-BSM-IRM_DC-C-07).

This applies to all engineering, design, process, and nuclear safety calculations, including "single-use spreadsheets" (see Section 5.0).

The following calculation products are not subject to the requirements of this procedure:

- Computations as defined in Section 5.0.
- Business, financial, or non-technical calculations.
- Calculations performed to check or verify another calculation, software, or spreadsheet.
- Calculations for removal of items for disposal.

2.0 IMPLEMENTATION

This procedure is effective on the date shown on the header. Calculations already prepared or in process may continue according to the previous revision.

Single-use spreadsheets prepared in accordance with TFC-ENG-DESIGN-C-32 that are in the final review and approval process pending release prior to or on the date of issue of this procedure revision may continue to be processed in accordance with TFC-ENG-DESIGN-C-32.

Single-use spreadsheets released in accordance with TFC-ENG-DESIGN-C-32 prior to the issue date of this procedure revision are not required to meet the documentation and verification requirements of this procedure revision.

3.0 RESPONSIBILITIES

(7.1.3)

Key responsibilities are listed in the following sections. Further responsibilities are contained within Section 4.0. Additional responsibilities for Originating Calculations are contained in TFC-ENG-DESIGN-C-25, Section 3.0.

Originators, managers, and checkers of organizations other than Engineering (e.g., 222-S Laboratory Analytical Services, ESH&Q) shall have the responsibilities and perform the actions of the Engineering document originators, Engineering managers, and checkers that are described in this procedure, TFC-ENG-DESIGN-C-52, and TFC-ENG-DESIGN-P-17.

3.1 Manager

- Assigns qualified personnel to each role listed in Section 3.0.
- Ensures calculations are complete, accurate, and technically sound.
- Approves the scope of the calculation.

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3.2 Originator

- Prepares/modifies calculations in accordance with this procedure and instructions.
- Ensures technical accuracy of the calculation.
- Ensures software used to prepare/perform calculations is approved for use in Hanford Information System Inventory (HISI). (7.1.1)
- Follows procedures/standards governing preparation, review, and approval of calculations.

3.3 Checker

- Checks and approves engineering calculations in accordance with TFC-ENG-DESIGN-C-52.
- Checks and approves non-engineering calculations in accordance with the Calculation Checklist (SPF-021) without recourse to TFC-ENG-DESIGN-C-52.
- The checker is sufficiently independent, knowledgeable in the subject matter area, and qualified to perform similar calculations.

3.4 Design Verifier

Verifies engineering calculations (as applicable) in accordance with TFC-ENG-DESIGN-C-52.

3.5 Design Authority

- Approves calculations that impact (or affect) the Technical Baseline.
- Ensures calculations are technically acceptable.
- Determines if calculations are Technical Baseline Documents or non-Technical Baseline Documents as defined in TFC-ENG-STD-46.

4.0 PROCEDURE

4.1 General Requirements

NOTE 1: Certain calculations included in work packages are not issued/released in accordance with TFC-ENG-DESIGN-C-25, but otherwise follow this procedure. These include calculations required for: removal of items for disposal; construction, such as shoring calculations; and, temporary modifications installed according to TFC-OPS-OPER-C-11 (these shall be issued/released if the modification is made permanent).

NOTE 2: Non-Engineering calculations are not design calculations. Design must follow the requirements for engineering calculations.

1. Calculations are released in Smart Plant® Foundation (SPF) in accordance with TFC-ENG-DESIGN-C-25 as either standalone documents or embedded in technical documents:
 - a. For creating calculations as standalone documents, Section 4.2 applies.
 - b. For calculations embedded in technical documents, Section 4.4 applies.
 - c. For calculations submitted by outside contractors or suppliers using TFC-BSM-IRM_DC-C-07, Section 4.6 applies.
2. Calculations are required to be approved and released prior to relying on the results of the calculation and/or using an item the calculation supports.
3. Engineering calculations shall be checked, reviewed, and approved in accordance with TFC-ENG-DESIGN-C-52. All calculations require checking and completion of a Calculation Checklist (SPF-021), according to TFC-ENG-DESIGN-P-54. This applies to both standalone calculations and calculations embedded in technical documents.
4. Non-engineering calculations shall be checked in accordance with the Calculation Checklist (SPF-021) without recourse to TFC-ENG-DESIGN-C-52.
5. An unlisted component evaluation should be included in the “Non-Listed Components” on the Engineers Toolbox. Update the file or provide the number and title of calculation documents that include unlisted component evaluations to the Engineering Web Page Administrator for updating of the table (or schedule/record) in the Engineers Toolbox.

4.2 Preparing Standalone Calculations

This section provides direction for preparing calculations and is performed in conjunction with TFC-ENG-DESIGN-C-25, Sections 4.1 and 4.2.

NOTE 1: Standalone calculations are prepared when the intent is to perform and present analysis results in a stand-alone calculation report. If the analysis itself is simple and supports the basis or conclusions of another document, then it may be included as part of that document as described in Section 4.4.

NOTE 2: When preparing calculations in support of documents that have procedurally specific format requirements, the document-specific format requirements takes precedence over the format requirements of this procedure (e.g., waste compatibility assessments [TFC-ENG-CHEM-P-13]).

NOTE 3: When preparing a new or revised calculation that is to be used to implement the safety basis, this element must be included in the scope of the calculation.

- Manager
1. Assign a qualified engineer or analyst, who is competent in the discipline or subject matter, to prepare the calculation (hereinafter, Originator).

NOTE: SPF allows the creation of three types of calculations as follows:

- Conceptual/preliminary/scoping calculations,

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- Originator
- Formal calculations, or
 - Set point calculations.
2. Create a new calculation document in SPF in accordance with TFC-ENG-DESIGN-C-25 Section 4.1; SPF will generate a unique document number.
 3. Prepare the calculation, ensuring:
 - The body follows the formatting criteria in Attachment A; additional sections may be added and arranged at the discretion of the Originator
 - The calculation is a legible form suitable for reproduction, filing, and retrieval
 - The page numbers are in sequential order; document number, and the revision number are included in the header of each page of the calculation and on all attachment pages
 - A technically qualified, independent person (e.g., checker) can repeat the calculation and come to the same conclusion without recourse to the Originator.
 4. Assess the results of the calculation for impacts to requirements:
 - a. Ensure appropriate changes are incorporated into affected requirements documents (e.g., system/subsystem specifications and Operating Specification Documents).
 - b. If changes to other documents are required, process in accordance with the applicable controlling procedure and TFC-ENG-DESIGN-C-25.

NOTE: The SPF workflow will automatically route the calculation for USQ Evaluation and PrHA Screening when applicable.

5. Prepare the calculation for checking, review, and approval in SPF in accordance with TFC-ENG-DESIGN-C-25, Section 4.2, and the Document Release and Change Form (DRCF) instructions available from the SPF web page under Form Instructions.
 - a. Attach the electronic calculation file to the SPF document.
 - b. Attach a blank Calculation Checklist (SPF-021) to the SPF document, selecting to “Include in Final Record PDF?”
 - c. Assign, at a minimum, the following reviewers and approvers for calculations:
 - Originator (always required)

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- Checker (always required)
- Specialty Reviewers/Approvers, including additional Design Authorities and EDLs (as applicable in accordance with TFC-ENG-DESIGN-C-52 and Section 3.0)
- Design Authority (required for nuclear facility technical baseline documents)
- Manager (always required).

4.3 Checking, Reviewing, and Approving Calculations

This section provides specific requirements for the checking, reviewing, and approving calculations and is performed in conjunction with TFC-ENG-DESIGN-C-25, Section 4.3. For electronic review and approval, individuals performing these functions will be prompted via SPF workflow assignment to complete their assigned check, review, or approval. For hard copy review and approval, the Originator will provide the calculation package to the specified checker, reviewers, and approvers.

Formal engineering calculations, as defined in Section 5.0, require comment collection and resolution in Review Comment Records (RCRs) per TFC-ENG-DESIGN-C-52.

- Originator
1. Proceed to TFC-ENG-DESIGN-C-25 Section 4.3 to begin the review and approval process:
 - a. For engineering calculations, in conjunction with TFC-ENG-DESIGN-C-52, select required reviewers and determine how comments are to be collected for the calculation (e.g., Review Comment Record [RCR], SPF Comments).
 - b. For non-engineering calculations, ensure that the document is reviewed by any individuals or organizations impacted by the calculation, and determine how comments are to be collected (e.g., SPF comments or manual collection and resolution of comments/markups by the Document Author/Originator).
 2. Complete the Calculation Checklist (SPF-021), by using the Edit>Checkout/Check In function in SPF.

NOTE 1: Additional organization-specific review checklists may be used.

NOTE 2: Where calculations are prepared in support of documents that have their own procedural preparation and review requirements, a document-specific review checklist may be substituted for the Calculation Checklist (SPF-021).

- Checker
3. Check calculations as indicated below:
 - a. For engineering calculations, follow TFC-ENG-DESIGN-C-52 and complete Calculation Checklist (SPF-021).

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- b. For non-engineering calculations, check the calculation for technical adequacy and correctness and complete Calculation Checklist (Form SPF-021).
 4. After checking is complete, send calculations to the appropriate reviewer or reviewers for completion of the technical review.
 - Identified Reviewers
 5. Conduct technical reviews of engineering calculations as indicated below, providing comments in the specified format (e.g., RCR, SPF Comment).
 - a. For engineering calculations, conduct technical reviews in accordance with TFC-ENG-DESIGN-C-52.
 - b. For non-engineering calculations, review calculation for technical adequacy and completeness.
- NOTE: Manager approval takes place after USQ and PrHA approval.
- Originator
 6. If an RCR was used to collect comments, ensure all comments have been documented as resolved on the RCR, and all final approvals are completed on the form.
 - Identified Approvers
 7. Evaluate calculation for technical adequacy and completeness; approve.

4.4 Calculations in Other Technical Documents

This section identifies how to handle calculations included in technical documents whose main purpose is not to perform the calculation itself. Other technical documents that may contain calculations may include:

- Technical Evaluations (see TFC-ENG-FACSup-C-03)
- Technical Documents released in accordance with TFC-ENG-DESIGN-C-25, or
- Performance and Functional Requirements/Evaluation for Special Tools and Equipment (see TFC-OPS-MAINT-C-01).

Such documents are prepared for many purposes, including:

- Interpreting calculation results
- Using calculation results to make programmatic decisions
- Supporting design descriptions
- Supporting operational decisions
- Supporting safety basis documents and decisions
- Supporting environmental permitting documents and decisions.

It is especially important for authors and reviewers of technical documents to recognize when the document contains calculations and ensure: calculations meet the requirements of this procedure; relevant design inputs are clearly identified; and the document is reviewed for acceptability in the same manner as if it were issued as a separate calculation.

Calculations may be presented in text documents in one of two ways:

- Embedded in the main body of a document
- Included as an appendix to a document.

When choosing how to present a calculation, consider the complexity of the calculation and the need for the reader to be able to view the calculation details within the primary document.

- Ensure relevant inputs to the calculation are clearly identified (design inputs for design calculations)
- Ensure calculation is reviewed for acceptability in the same manner as if it were issued as a separate calculation
- Ensure the document contains the elements/content required in Attachment A, even though the section headings and arrangement of material may be tailored for the particular technical document.

Technical documents containing calculations are prepared and released in accordance with TFC-ENG-DESIGN-C-25.

4.5 Revision of Approved Calculations

- | | |
|------------|---|
| Originator | <ol style="list-style-type: none">1. If an inadequacy or error is found in a calculation that is part of a design basis (referenced in a system design description that has been issued), notify the affected organizational manager.2. Initiate a Problem Evaluation Request (PER) in accordance with TFC-ESHQ-Q_C-C-01.3. If a revision is required, such as an update to the analysis, new data, resolve inadequacies or errors, or to close a HOLD or To Be Determined (TBD) (see TFC-ENG-DESIGN-C-25), notify the affected Organizational Manager to revise calculation. |
| Manager | <ol style="list-style-type: none">4. Revise the calculation in accordance with TFC-ENG-DESIGN-C-25. |

4.6 Calculations by Subcontractors

Calculations prepared by outside contractors or suppliers for WRPS (non-shared resource) are prepared according to the quality assurance requirements identified in the procurement specification or subcontract and TFC-ENG-STD-51. These calculations must be accepted by WRPS in accordance with TFC-BSM-IRM_DC-C-07. Therefore, acceptance by WRPS is in addition to the subcontractor's quality assurance requirements.

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| Design Authority | <ol style="list-style-type: none">1. Ensure the technical reviews are performed in accordance with the requirements above and TFC-ENG-DESIGN-C-52. |
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5.0 DEFINITIONS

Alternate calculations. A method of verifying the correctness of original calculations or analyses by using alternate methods to perform an equivalent calculation. In performing an alternate calculation, the appropriateness of assumptions, input data, and computer hardware/software, if used, is also evaluated.

Assumption. An assumption is a *design input* that has no direct reference and is assigned a value or condition for the purpose of preparing a calculation. Assumptions are used to bound or simplify the analysis and justification must be provided. Assumptions must be verified as the design proceeds, adequately described and reasonable. Assumptions may be preliminary design parameters or based on judgment; they may be used when exact verifiable data cannot be found. Any assumptions that require later verification must be tracked for resolution.

Calculation. A calculation is an analysis that links plant documentation to design requirements and provides a quantitative basis for design. It is considered a formal document and must be self-explanatory or stand alone. It describes the process of answering a problem; it usually documents a decision.

Competent. An engineer or analyst who is knowledgeable through education, experience and training of the discipline, applicable regulations, standards, equipment, and systems in their area of expertise as assigned by management.

Computation. A computation is defined by the following:

- Assumptions are not needed
- Special engineering expertise is not needed
- A permanent record is not needed (i.e., it does not need to be referenced and can easily be reconstructed)
- Engineering or technical expertise is used to evaluate the problem, and a formal calculation is not required.

Examples of computations include length of a zip cord, areas and volumes, simple thermal expansion, and simple unit conversions. There are no procedural requirements for computations.

Finite Element Method (FEM). Analyses that are utilized to determine stresses or displacements of structural elements. These FEM analyses apply to members (beams, plates, membranes, shells or piping) subjected to imposed dead, live, thermal, hydrostatic, dynamic, soil or natural phenomena loads.

Multiple-use spreadsheet. Spreadsheet or spreadsheet template to be used multiple times or by multiple users for performing routine or standardized calculations or analyses that is independently pre-verified in accordance with TFC-ENG-DESIGN-C-32 and whose design inputs are independently verified in accordance with this procedure or other controlling procedure.

Single-use spreadsheet. Spreadsheet to be used one time to perform a single set of calculations or analyses.

Temporary modification. Temporary minor alterations made to structures, systems, or components that do not conform to approved design configuration and change the design function. The alterations are temporary in that they generally are expected to be installed for three months or less. The following are examples of temporary modifications (TMs) that may require calculations:

- Setpoint changes (when setpoint is specified in engineering document)
- Temporary installation or removal of pipe supports
- Material substitutions (mismatched bolts, pipe material, etc.)
- Disabled reliefs or safety valves
- Mechanical jumpers/bypasses (unless covered in PMs or CMs)
- Blocked or abnormally positioned valves (unless covered in lock and tag).

Utility Calculation Software. Software that typically uses commercial-off-the-shelf spreadsheet applications as a foundation and user-developed algorithms or data structures to create simple software products.

6.0 RECORDS

The following record is generated during the performance of this procedure:

- Calculation Package.

The record custodian identified in the Company Level Records Inventory and Disposition Schedules (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.

7.0 SOURCES

7.1 Requirements

- 7.1.1 TFC-BSM-IRM_HS-C-03, "Software Management."
- 7.1.2 TFC-PLN-02, "Quality Assurance Program Description."
- 7.1.3 TFC-PLN-03, "Engineering Program Management Plan."

7.2 References

- 7.2.1 TFC-BSM-IRM_DC-C-02, "Records Management."
- 7.2.2 TFC-BSM-IRM_DC-C-07, "Vendor Processes."
- 7.2.3 TFC-ENG-CHEM-P-13, "Tank Waste Compatibility Assessments."

- 7.2.4 TFC-ENG-DESIGN-C-25, “Technical Document Control.”
- 7.2.5 TFC-ENG-DESIGN-C-32, “Utility Calculation Software Management.”
- 7.2.6 TFC-ENG-DESIGN C-52, “Technical Reviews.”
- 7.2.7 TFC-ENG-DESIGN-P-54, “Checking of Engineering Documents.”
- 7.2.8 TFC-ENG-FAC SUP-C-03, “Technical Evaluations.”
- 7.2.9 TFC-ENG-STD-46, “Technical Baseline Management.”
- 7.2.10 TFC-ENG-STD-51, “Vendor Calculation Standard.”
- 7.2.11 TFC-ESHQ-Q_C-C-01, “Problem Evaluation Request.”
- 7.2.12 TFC-OPS-MAINT-C-01, “Tank Operations Contractor Work Control.”
- 7.2.13 TFC-OPS-OPER-C-11, “Equipment Temporary Modifications and Bypasses.”

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ATTACHMENT A - CALCULATION FORMAT AND PREPARATION INSTRUCTIONS

Include the following sections in the body of the calculation that are marked “required.” Other sections may be added as needed and the exact order of the sections is optional.

1. **Objective/Purpose** (required)

Describe the objectives (including the required end products) of the analysis including a problem statement. Describe the analysis performed in the calculation. For design calculations, identify the calculation’s design requirements and applicable National Codes and Standards. When preparing a new or revised calculation that is to be used to implement the safety basis, this element must be included in the scope of the calculation.

2. **Summary of Results and Conclusions** (optional depending on calculation length or complexity)

For lengthy or complex calculations, summarize the results and conclusions contained in later sections, highlighting the key points.

3. **Introduction/Background** (optional)

Provide any background information needed to understand the calculation purpose.

4. **Input Data** (required)

Information that serves as input to the calculation must be referenced to the source.

Information used to produce a hand calculation or used as input for a computer code or spreadsheet must be explicitly stated, or be included in an attachment that will be part of the calculation. (It is not intended that impractical attachments, such as voluminous databases, be included.) Extensive compilations of input data used in more complex calculations may be better contained in separate appendixes.

Data files used in computer codes, with associated release numbers or dates, shall be listed. Enough information shall be included in the report to allow a complete reconstruction of all the input cases. This may include publishing all input files used to reach the conclusion(s) in the calculation.

Copies of reference information should be made available to the checker and organizational manager to simplify the review and approval process. Results of literature searches or other applicable background data shall be identified.

Information or data used to produce a hand calculation or used as input to a computer code or spreadsheet shall be included in an attachment. In the case of voluminous data from databases registered in Hanford Information System Inventory (HISI); reference can be made to the specific query, specific spreadsheet, date of query, column and range of data used in the calculation.

Boundary and initial conditions (including those used in finite element analyses) shall be clearly defined and justified. This includes effects with interfacing systems, structures, and components (SSCs) and physical phenomena (e.g., structural loads, temperatures, flow rates, pressures, chemical contents, voltages, and currents).

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ATTACHMENT A - CALCULATION FORMAT AND PREPARATION INSTRUCTIONS (cont.)

Where multiple-use spreadsheets are used in support of calculation preparation, document the sources of the input data in this section and complete verification that input data is correctly entered.

In documenting input data, preference should be given to providing the information in a numbered list format with a description of the type of input data used and the reference that it was taken from.

5. **Assumptions** (required if assumptions are made)

Explicitly state or reference assumptions used in the analysis along with supporting data or information. Assumptions that are stated must be used within the calculation. At a minimum, list key assumptions that must be verified prior to relying on the calculation for operation (e.g., those providing a basis for selection of TSRs and safety structures, systems, and components). HOLD or To Be Determined (TBD) notations for missing information or unverified assumptions must be controlled in accordance with TFC-ENG-DESIGN-C-25. Any assumptions that require later verification must be tracked for resolution.

The use of testing as a checking method for calculations produced using software that is not pre-verified (i.e., single-use spreadsheets) is to be listed as an assumption requiring verification. Test results that validate the calculation are to be provided to verify the assumption.

6. **Method of Analysis** (required)

The method needs to “stand alone” in quality and completeness so that a reasonably knowledgeable person would not have to seek the originator’s input on the methodology used in order to arrive at the same conclusions. Provide a brief description of the method of solution, numerical computations, and identification of the source or derivation of all equations that are not common usage. The method should use recognized national standards wherever possible with clear derivation of or reference to equations and any limitations on their use. Provide diagrams, sketches, photographs, or drawings to clarify extent of the calculation and provide visual association with the actual configuration. Structural calculations, as a minimum, require a free body diagram that should include dimensions, forces, moments, and reactions; the free body diagram should be legible and should clearly represent the actual configuration.

If the calculation uses computer software, ensure the bases (of reference thereto) supporting application of the computer program to the specific physical problem is described in this section. If a formulation has been taken from an unpublished reference (such as an internal memo) or was developed by the engineer/analyst, the validity of the model or correlation must be demonstrated. The engineer/analyst must ensure that the uncertainties thus introduced will not impact the conclusions of the document. The actual numerical calculations may be included in this section where practical. Complex calculations or spreadsheets not readily contained within the body of the calculation are better contained in separate appendices.

Information necessary to reconstruct the analysis, including hand calculations, must be included.

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ATTACHMENT A - CALCULATION FORMAT AND PREPARATION INSTRUCTIONS (cont.)

Where “multiple-use” spreadsheets are used, their methodology will be documented in a Software Management Plan (SMP) in accordance with TFC-ENG-DESIGN-C-32. Reference should be made to that SMP for a description of the methodology rather than repeating that information in this section.

Where single-use spreadsheets are used, their method should be described in this section or in a separate appendix, using one of the following methods.

- Explode and print equations (e.g., cell formulae contents), macros, scripts, or strings of multiple functions. If a formula is applied to a series of cells, only one instance of the formula is necessary to be shown in this section.
- Sufficiently document equations, external links, and code used in each cell so as to allow independent recreation via hand calculation.
- Provide a description of the electronic spreadsheet file and how it is used to perform the calculation; attach the electronic spreadsheet file to the document in SPF.

7. Use of Computer Software (required if software is used)

Documentation of computer software application use shall include identification of the computer type, computer program name, revision, and evidence of or reference to computer program verification as discussed in this section below; inputs (see Input Data, Section 4 above); and, outputs (see Results, Section 8).

Documentation is not required for computer programs that are used only to prepare the document and/or that do not perform computational functions (e.g., Word®, Visio®).

The use of pre-verified computer software to perform calculations is limited to software registered and approved for use in HISI, including: Utility Calculation Software (i.e., multiple-use spreadsheets) controlled in accordance with TFC-ENG-DESIGN-C-32; and, Custom Developed/Acquired commercial-off-the-shelf (COTS) software controlled in accordance with TFC-BSM-IRM_HS-C-03.

A single-use spreadsheet used to perform a calculation does not require registration into HISI or separate software life cycle documentation; all single-use spreadsheets require checking and verification with each use in accordance with TFC-ENG-DESIGN-P-54, including a completed Calculation Checklist at the beginning of the calculation as required.

If a single-use spreadsheet is to the level of sophistication (e.g. extensive use of Visual Basic for Applications [VBA]), complexity, or volume that it cannot be readily verified with each use (e.g., via hand calculation), it requires pre-verification and shall be processed as either a multiple-use spreadsheet in accordance with TFC-ENG-DESIGN-C-32, or Custom Developed software in accordance with TFC-BSM-IRM_HS-C-03.

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ATTACHMENT A - CALCULATION FORMAT AND PREPARATION INSTRUCTIONS (cont.)

The following information shall be included, as a minimum, in this section for each spreadsheet used in support of the calculation:

- Software and version used to create spreadsheet (e.g., Excel® 2013)
- File name and version of spreadsheet
- HISI ID# (for multiple-use spreadsheets)
- Software Management Plan document number/revision (for multiple-use spreadsheets).
- Spreadsheet Verification and Release Form Number (for legacy multiple-use spreadsheets)

The following information shall be included, as a minimum, in this section for non-spreadsheet software used in support of the calculation:

- Software name and version used to perform the calculation
- Software HISI ID#
- Software Management Plan document number and revision

8. Results (required)

Describe the results obtained. The number of significant figures reported shall be consistent with the quality of the data and with its purpose.

9. Conclusions (required)

Describe the degree to which the objectives and purpose have been met along with information on the appropriateness and completeness of the results for the intended purpose. Do not present new information in the conclusions; only draw on information previously presented in the body of the calculation.

10. Recommendations (optional)

List the recommendation(s) including basis information. If recommendations are provided as the Design Basis for a system, structure, or components (SSC), the recommendations shall be provided on the design drawings or design media; or, a PER shall be written (Reference TFC-ENG-DESIGN-C-25).

11. References (required)

Examples of references include drawings, reports, change notices, manuals, publications, codes, and standards. Provide the title, author (or company), and revision number or publication date, if available. References that may not be retrievable in the future shall be added to the document as attachments. The engineer/analyst must be able to supply the reviewer with a copy of any document cited in the analysis.

ATTACHMENT A - CALCULATION FORMAT AND PREPARATION INSTRUCTIONS (cont.)

12. Attachments and Appendixes (optional)

Include additional information such as computer software documentation (including spreadsheet printouts where practical), calculation review checklist(s), detailed calculations not readily contained in the main body, extensive compilations of input data, inspection reports, and copies of references, memos, or pages of manuals that are not otherwise readily retrievable from document control or records systems.