

Waiver #227 exists against this procedure. This waiver waives the requirement in section 8.0, 4.2.2, and 4.6 of TFC-ENG-DESIGN-C-06 and Section 4.4 of TFC-ENG-DESIGN-C-09 for a design authority to approve technical baseline designs. This will be waived for non-nuclear facility designs as long as the designs are prepared by In-House Design Engineering and approved by a licensed professional engineer. Full text of the waiver can be viewed at <http://idmsweb/idms/livelink.exe/Open/170103064>.

<b>ENGINEERING DRAWINGS</b>	<b>Manual Document Page Issue Date</b>	<b>RPP-27195 Engineering TFC-ENG-DESIGN-C-09, REV D-1 1 of 19 February 1, 2012</b>
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[Ownership matrix](#)

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## **1.0 PURPOSE AND SCOPE**

This procedure describes the process used to prepare, verify, approve, release, and revise two and three dimensional engineering drawings initiated by or for Tank Operations Contractor (TOC) personnel. This procedure applies to all H series drawings that are released into the Document Management and Control System (DMCS) by or for the TOC. Any deviation from this procedure must have the approval of the procedure owner. (7.1.2)

## **2.0 IMPLEMENTATION**

This procedure is effective on the date shown in the header. New drawings, drawing sheets, and revised drawings, meeting the requirements of the previous revision will be accepted for release into the DMCS for a period of sixty days after the effective date shown in the header. After the sixty day time period, all new drawings, drawing sheets, and revised drawings that are submitted for release into DMCS will comply with this revision of the procedure.

## **3.0 RESPONSIBILITIES**

### **3.1 Design Engineering**

1. Authorizes drafter/designer access to the DMCS; authorizes checkout of released mylar drawings; authorizes access to DMCS to check out existing drawing files to be used for revision updates and ECN incorporation; authorizes access to DMCS to perform final plots and release of new drawings and supports development and maintenance of auxiliary support files and information for the preparation of drawings. The available files and information include:
  - Drawing start models (AutoCAD prototype drawings)
  - Symbol libraries (e.g., architectural, electrical, control systems, Piping & Instrument Diagrams [P&ID]).
  - Files of existing, released drawings.
  - Copies of engineering change notices and associated files.
2. Ensures Facility Modification Engineering Change Notices (ECNs) that are work completed are incorporated into drawings using the following criteria:
  - Essential drawing - Revise within 30 calendar days of ECN work completion date
  - Support drawing with AutoCAD file - Revise within 60 calendar days from the date of the third work-completed ECN.
  - Support drawing without AutoCAD File - Revise within 90 calendar days from the date of the sixth work-completed ECN.
  - Reference drawing – These drawings are not kept current.
3. Originates new and revised drawings in accordance with this procedure and in compliance with TFC-ENG-STD-10.

4. Creates ECN attachment pages for new modification work to be performed in the Tank Farms facilities, so that the pages are in compliance with this procedure and TFC-ENG-STD-10.

### **3.2 General Responsibilities for Engineers and Managers**

1. The “responsible engineer” is responsible for ensuring that the design depicted by the drawing is consistent with the existing facility configuration, related calculations, specifications, related requirements and criteria, and prepared in accordance with the applicable procedure(s). This also includes ensuring the technical accuracy of the drawing, sufficient justification, completeness of design, and identification of applicable affected documents. The responsible engineer may also be the design authority in accordance with TFC-PLN-03.
2. The “design engineer” is the individual in “responsible charge” for developing the design that is shown on the drawing(s). The design engineer works directly with the designer/drafter to ensure the drawings and engineering work supporting the drawings is performed in a quality manner and in accordance with WRPS procedures and standards. The design engineer shall hold a minimum “Limited Engineer” qualification or, if signing for an architect-engineer, be qualified under their QA program.
3. The “responsible manager” is responsible for the quality of the drawing. This includes ensuring title blocks are filled in correctly, the data presented is logical, and the drawing follows this procedure and TFC-ENG-STD-10. This manager also has the responsibility to ensure designs are subject to design verification in accordance with TFC-ENG-DESIGN-P-17.
4. The “engineering checker” performs a peer review of the product to ensure that the engineering is adequate, complete, correct, and of good quality. The person signing as “engineering checker” shall hold either a “Core Engineer” or “Limited Engineer” qualification or, if signing for an architect-engineer, be qualified under their QA program.

## **4.0 PROCEDURE**

(7.1.4.b, 7.1.4.g)

See Figure 1 for drawing process flow diagram.

### **4.1 General Requirements**

1. Each active drawing is assigned a project status code to identify the current drawing use. Drawings may be used to support operations of a facility; for project activities (design, fabrication, and construction) or jointly used to support facility operations and to support project activities. The terms **Facility Status, Project Status, and Shared Status** are the project status codes used. Status codes are established and changed using the DMCS Change Notice Form (A-6003-917).
2. All new drawings or drawing sheets being released with an Engineering Data Transmittal (EDT) or by an ECN incorporation shall be accompanied by a DMCS Change Notice Form (A-6003-917) designating the facility, shared, or project status of the new drawing or drawing sheet. If the new drawing or drawing sheet is being placed in project status or shared status, the project number must be provided on the EDT and the DMCS Change Notice Form. If the project number does not exist in DMCS, it must be added using the DMCS New Object Form (A-6005-659). If a project number has not been established for the project it will be necessary to obtain a new project number. New project numbers are assigned through the

Project Navigator system. To access the Project Navigator system, use the link on the WRPS intranet home page to go to the Project Navigator page and follow the available instructions for how to assign and obtain a new project number. The new drawing or drawing sheet shall be designated as either essential, support or reference and this must also be shown on the DMCS Change Notice Form.

3. All new drawings and drawing sheets that either modify existing systems within the Tank Farms or construct new systems shall be designated as project status at the time of their release. The new drawings and drawing sheets shall remain in project status until the project is turned over to operating status at which time they shall be changed to facility status. Any existing drawings that are being modified by a project shall be placed into shared status and remain in shared status until the project is turned over to operating status, at which time they shall be returned to facility status.
4. Each Essential and Support drawing is assigned an Approval Authority Identification Number (System ID). The System ID is used to identify the Primary and Alternate engineers that are assigned approval authority for the drawing. System IDs are established or changed using the DMCS Change Notice Form.
5. Sketches for Lockout/Tagout, or Excavation, Shoring or Trenching are documented and approved using the Lockout/Tagout Sketch Sheet, A-6003-128, or the Excavation, Shoring and Trenching Sketch Sheet, A-6003-916.

NOTE: Lockout/Tagout and Excavation, Shoring and Trenching Sketches are not to be used to correct errors or inconsistencies in drawings.

6. Drawings are not to be used to control text only information.
7. The DMCS Change Notice form (A-6003-917) is used to establish or change a drawing category, System ID, project/facility/shared status and/or Environmental Permit drawings in DMCS. The DMCS New Object Form (A-6005-659) shall be used to initially establish a new System ID and project number in DMCS.
8. For information on the processing and categories of vendor drawings, see TFC-ENG-STD-10, Section 3.2.4.
9. Drawings that are being changed from reference to either essential or support categories must have all of their outstanding work completed ECNs incorporated and the drawings released as a new revision prior to the category change.
10. The drawing number series listed in Table 1 are to be used for all new tank farm drawings. Existing drawings that are re-categorized or are not H-2 or H-6 drawing number series retain their original numbers. Numbers for new drawings are obtained from the Hanford Document Numbering System (HDNS), except as noted below and are released using an EDT. To add a sheet to an existing drawing that is being created by a work completed ECN incorporation, determine the next available sheet number using DMCS. New drawing sheets being added to an existing set of drawings that depict new work to be performed shall be released using an EDT. Use DMCS to determine the next available sheet number.

**Table 1. Drawing Number Series.**

Drawing Series	Usage Description
H-2-XXXXXX	Used for all 200 Area Tank Farm facility reference, support, and essential drawings except those drawings for the single shell and double shell tank farms.
H-6-XXXXXX	Used for new drawings within WRPS scope that are in the 600 area (outside the 200 East and 200 West areas.)
H-13-XXXXXX	Used for topographic, electrical distribution system and Hanford Facility RCRA (Resource Conservation and Recovery Act) permit maps.
H-14-0XXXXXX	Used for new essential drawings for the single-shell and double-shell tank farms. The H-14-0XXXXXX drawing numbers are assigned and controlled in accordance with drawing H-14-020000.  NOTE: Essential drawings for Tank Retrieval/Closure Projects may be identified as H-14-1XXXXXX drawings.
H-14-1XXXXXX	Used for new project or facility non-essential or support drawings for the single-shell and double-shell tank farms.
H-15-XXXXXX	Used for three dimensional drawings.
SK-2-XXXXXX	Used for drawings that will not become part of the permanent facility. An SK-2 sketch may be approved and released like an H-series drawing or may be included as a figure or attachment in a released document.

#### 4.2 Preparation of New Drawings and Drawings Sheets

- |                     |   |
|---------------------|---|
| Responsible Manager | <ol style="list-style-type: none"> <li>1. Assign a qualified design engineer to develop the design and oversee the production of the required drawings. (7.1.1)</li> <li>2. Assign a qualified designer/drafter to prepare the required drawings.</li> <li>3. Provide design and schedule requirements to designer/drafter and design engineer.</li> </ol>  |
| Preparer            | <ol style="list-style-type: none"> <li>4. For a new drawing, obtain the drawing number from the HDNS or from H-14-020000 as appropriate (see Table 1). A new drawing is the initial release of a drawing depicting new work to be performed or depicting new information.. New drawings shall be released with an EDT.               <ol style="list-style-type: none"> <li>a. For a new drawing sheet being added to an existing drawing set, obtain the next available sheet number from DMCS. A new drawing sheet is the initial release of a sheet added to an existing set depicting new work to be performed or depicting new information. A new drawing sheet added to an existing set shall be released with an EDT.</li> <li>b. For a new drawing sheet being added to an existing drawing set in order to fully incorporate a work completed ECN, obtain the</li> </ol> </li> </ol> |

next available sheet number from DMCS. Adding information to an existing drawing by incorporating a work completed engineering change notice that will cause a new drawing sheet to be added to the drawing set is considered a revision. The releasing document for the new sheet will be the work completed ECN.

5. Determine the additional forms required (DMCS Change Notice Form, DMCS New Object Form) and complete as required to establish categories and status.
6. Prepare new drawing or additional sheet in accordance with [TFC-ENG-STD-10](#). Sketches (SK-2-XXXXX) are not required to follow TFC-ENG-STD-10, with the exception of the title block information.
7. Ensure proper level of protection is identified and provided for all classified and unclassified information in accordance with TFC-BSM-IRM-STD-03, TFC-BSM-IRM\_SE-C-03, and [TFC-BSM-IRM\\_DC-C-03](#).
8. Determine the Drawing Category, Approval Authority ID, and whether the drawing is an Environmental Permit drawing, and then prepare an DMCS change notice (see Section 4.7)

### 4.3 Drawing Review

This section applies when a new drawing sheet is being prepared. When a revision to an existing drawing occurs or a new sheet to an existing drawing is being added due to ECN incorporation, proceed to Section 4.5.

Responsible  
Engineer

1. Determine the review required and provide a copy of the drawing package (drawing sheets with related documentation and background information) to the assigned reviewer(s).
2. Conduct design verification in accordance with TFC-ENG-DESIGN-P-17, as applicable. (7.1.1)

Reviewer

3. Check each drawing sheet and ensure that the drawing meets the objectives outlined in Attachment A.
  - During the review, mark the check copy of the drawing to identify areas that do not meet requirements and to provide comments and corrections.
4. Return the reviewed drawing package to the preparer.

- |                  |    |  |
|------------------|----|--|
| Drafting Checker | 5. | Check the drawing for compliance with the drafting and layering conventions specified in TFC-ENG-STD-10 and the items listed in Attachment A. <ol style="list-style-type: none"><li>a. During the drafting check, mark the check copy of the drawing to identify areas that do not meet requirements and to provide comments and corrections.</li><li>b. Return the checked drawing package to the preparer.</li></ol> |
| Preparer         | 6. | Review and incorporate the drawing package comments and the checking comments into the CAD file. <ol style="list-style-type: none"><li>a. Resolve conflicts and discrepancies, as necessary with the reviewer, checker, and the lead discipline design engineer.</li><li>a. As required, provide a copy of the drawing sheet for back checking.</li></ol>  |
|                  | 7. | Obtain an EDT number from HDNS and enter the EDT number in the drawing title block.  |

#### **4.4 Drawing Approval and Release**

- |                            |    |  |
|----------------------------|----|--|
| Preparer                   | 1. | Submit the CAD data set into the DMCS and Final Plot the drawing for approval and release. <ul style="list-style-type: none"><li>• Drawing files that are placed in the DMCS must be in the current site approved AutoCAD DWG file format.</li><li>• The Final Plot process checks the drawing data set to ensure assigned line widths are greater than 0.25 mm, assigns a PLOT ID number, performs a plot of the drawing, and stores the PLOT ID number in DMCS.</li><li>• Refer to Final Plot in the DMCS User Help files for software user information.</li></ul> |
| Drafting Checker           | 2. | Approve the drawing by printing name, signing, and dating the Drafting Approved block.   |
| Design Engineer            | 3. | Approve the drawings by printing name, signing, and dating the Design Engineer Approved block.   |
| Engineering Checker        | 4. | Approve the drawing by printing name, signing, and dating the Engineering Checker Approved block.  |
| Professional Engineer (PE) | 5. | If a professional engineer signature and stamp is required, affix the stamp to the drawing and obtain the signature of the PE on the drawing prior to the responsible engineer signing the drawing.  |

NOTE: Only Architect-Engineers (A-Es) may apply PE stamps/signatures to drawings.

- Design Authority
6. Approve the drawing by printing name, signing and dating the Engineer block. (7.1.5)
  7. If the drawing is a new drawing or a new drawing sheet, prepare an EDT and obtain approvals, fill out the DMCS Change Notice Form and the DMCS New Object Form (if required), and release the EDT in accordance with [TFC-ENG-DESIGN-C-25](#).

NOTE: The DMCS Change Notice Form requires a project number to be entered. Project numbers can be obtained from Project Navigator, which is accessed from the WRPS Intranet. See also Section 4.1, Step 2.

#### 4.5 Drawing Revision

Drawing revision consists of incorporation of changes that are documented in work completed ECNs in accordance with [TFC-ENG-DESIGN-C-06](#). Drawing(s) may be revised, submitted and released with the ECN (direct revision).

NOTE: The conversion of a manual drawing to an AutoCAD file does not require the use of an ECN. For these drawing conversions, the drawing revision number shall be incremented, and the revision description on the drawing sheet shall include the following description: “manual to AutoCAD conversion.”

- Designer/Drafter
1. Obtain the CAD data set for the drawing to be revised and the ECNs to be incorporated from DMCS.

NOTE: ECNs to be incorporated are field work completed Facility Modification ECNs and Document Modification ECNs. Temporary ECNs are not incorporated into drawings.

2. Incorporate the ECN changes into the CAD data set.
  - a. Remove “Essential Drawing.”
  - b. Remove “Impact Levels.”
  - c. Remove “Confidence Levels.”
  - d. Remove “For Field Verification” block.
  - e. Remove signed stamps, such as: “Professional Engineer (PE), NACE Info, etc.”
  - f. Update the Title Block to the current ORP Title Block.
  - g. Ensure Panel Board Circuit Totals are the sum of the Individual Breaker Circuit Values.
  - h. Remove the off-site A-E and vendor logos from the drawing.

- |                      |  |
|----------------------|--|
|                      | 3. Provide a hard copy of the revised drawing to a designer/drafter assigned by the lead designer to provide a drafting check and a check of the ECN incorporation.  |
| Drafting Checker     | 4. Verify that the ECN changes/manual to AutoCAD conversions were incorporated correctly and completely, and that TFC-ENG-STD-10 drafting requirements are met, and approve the drawing (print name, sign, and date the revision block). |
| Responsible Engineer | 5. Ensure that the ECNs/manual to AutoCAD conversions listed in the revision block are correctly incorporated in the drawing and approve the drawing (print name, sign, and date in the revision block).                                 |
| Designer/Drafter     | 6. Incorporate any checker comments, submit the CAD data set into the DMCS, and Final Plot the drawing.  |
|                      | 7. Provide approved drawing to the Document Service Center for release.  |

#### 4.6 Field Verification

- |                      |  |
|----------------------|--|
| Responsible Engineer | 1. Determine drawings that need to be as-built, using Attachment B for guidance. |
|                      | 2. Ensure selected drawings are as-built and released.                           |

#### 4.7 Establishing and Updating Drawing Categories, Approval Authority ID and Environmental Permit Drawings

- |                      |  |
|----------------------|--|
| Responsible Manager  | 1. Determine those drawings that need to be categorized as "Essential" using Attachment C for guidance.  |
|                      | 2. Determine those drawings that need to be categorized as "Support" using Attachment C for guidance. This determination needs to be worked with step 1.   |
|                      | 3. Determine the Approval Authority ID Number for the drawing.   |
|                      | 4. Determine those drawings that are Environmental Permit Drawings.  |
| Responsible Engineer | 5. Obtain and complete the DMCS Change Notice form (A-6003-917) in accordance with the form instructions and print name, sign, and date the form as Responsible Engineer and submit to the responsible Engineering manager for approval. |

NOTE: All outstanding work completed ECNs shall be incorporated into the drawing and the drawing released as the next revision number prior to Document Control changing the document category.

- |                                 |  |
|---------------------------------|--|
| Responsible Engineering Manager | 6. Review and approve the DMCS Change Notice form. |
|---------------------------------|--|

- |                            |    |   |
|----------------------------|----|---|
| Design Engineering Manager | 7. | If the DMCS Change Notice form includes changes to drawings categorized as essential or support, review and concur with the proposed changes. |
| Responsible Engineer       | 8. | Submit approved DMCS Change Notice form to the Document Service Center for processing.  |

#### 4.8 Establishing and Updating Controlled Print Files

- |                                 |    |   |
|---------------------------------|----|---|
| Responsible Manager             | 1. | In conjunction with the Document Service Center, determine Controlled Print File (CPF) document control requirements, obtain the CPF number, and provide adequate funding.  |
|                                 |    | NOTE: CPF requirements include how many copies of each document/drawing are required, size of the drawings, location of the file, filing method, CPF audit frequency, and ensuring adequate work space is provided for the Document Service Center staff. |
| Responsible Engineer            | 2. | Obtain an DMCS Change Notice number from the HDNS.  |
|                                 | 3. | Identify the drawings and documents to be placed into or removed from the CPF, obtain, and complete the DMCS Change Notice form (A-6003-917) in accordance with the form instructions.  |
| Responsible Engineering Manager | 4. | Approve the DMCS Change Notice form.  |
| Responsible Engineer            | 5. | Submit approved DMCS Change Notice form to the Document Service Center.   |

#### 4.9 Establishing and Controlling Facility, Project, and Shared Drawings

- |                                 |    |   |
|---------------------------------|----|---|
| Project Engineer                | 1. | Identify the drawings/documents that are to be added to, deleted from Facility, Project, or Shared Status using the DMCS Change Notice form (A-6003-917).   |
|                                 |    | <ul style="list-style-type: none"> <li>• If the drawing changes impact multiple systems or projects, then approvals are required from the engineer and manager responsible for each system or project.</li> <li>• A DMCS Change Notice Form shall be used to place a drawing into project status during its initial release into DMCS.</li> </ul> |
|                                 | 2. | Approve the DMCS Change Notice form as the project engineer.  |
| Responsible Engineer            | 3. | Approve the DMCS Change Notice form as the system engineer.   |
| Responsible Engineering Manager | 4. | Approve the DMCS Change Notice form as the System Engineering manager.  |

- Project Manager            5.    Approve the DMCS Change Notice form as the project manager.
- Responsible  
Engineer                    6.    Submit approved DMCS Change Notice forms to the Document Service Center.

## **5.0    DEFINITIONS**

(7.1.4.a)

As-Built drawings. A drawing which is an ‘Essential’ or ‘Support’ drawing, including all unincorporated ECNs.

Controlled print file. A drawing/document file that provides operating organizations with a controlled set of hard copy drawings/documents and change documentation that is maintained current with released changes by the Document Service Center staff.

Design Engineer. The engineer in responsible charge of the design shown on the drawing medium. The design engineer may provide direction, sketches, and/or calculations as input to the design illustrated on the drawing. This role may be filled by any appropriately qualified TOC engineer or an A-E engineer qualified under the A-E’s ASME NQA-1 program.

Drafting Checker. An individual who is trained and knowledgeable with the drafting and layering requirements as contained in this procedure and in TFC-ENG-STD-10 and who holds a designer/drafter qualification or, if for an architect-engineer, is qualified under their QA program to perform drafting checking.

Essential drawings. A category of engineering drawings that depict active facility (e.g., nuclear and chemical storage facilities) systems, structures, and components (SSCs) and are necessary to support emergency response actions.

Facility as-building. An engineering activity to integrate newly released project As-Built drawings into the existing facility drawings. This activity is usually funded by the project and performed by the Architect Engineer as a separate contract activity. Facility as-building should be completed prior to placing equipment into service to insure that drawings are readily available for use.

Facility status. The status of drawings/documents that are being used to support operations of a facility or system. Changes to these drawings/documents require approval of the facility responsible engineer.

In DMCS, drawings/documents in facility status will either have no Project field appear on the page or the Project field will appear with a project code, name, and status and the owner will show as “No”. For additional help see DMCS-HLP-0043 located in the DMCS help files.

Professional Engineer. An engineer employed by an A&E who is licensed by the State of Washington with full authority to place his stamp and approval signature in his specific discipline on a design drawing when required by the statement of work.

Project status. The status of drawings/documents that are being used for project activities (design, fabrication, and construction). Changes to these drawings/documents require the approval of the project engineer.

In DMCS, drawings/documents in Project Status will have a Project field appear on the page with the project code, name and status of that project. The project that owns the drawings document will have

a “Yes” in the owner column. For additional help see DMCS-HLP-0043 located in the DMCS help files.

Project as-building. Activities performed by the constructor include:

- Update project drawings to show current configuration
- Perform field verification of updated drawings
- Update project design documents such as construction specifications, procurement specifications, and design specifications.

Reference drawings. A category of drawings that supplement essential and support drawings and provide construction, additional design, or historical information. Reference drawings may be used as “best available information,” but may not be used as the basis for design, maintenance, or operation decisions without confirmation. Reference drawings are not kept current but may be updated to support a facility upgrade or project activities with approval of an engineering manager.

Responsible charge. This refers to being directly responsible for and in charge of preparing or supervising the preparation of engineering design products.

Shared status. The status of drawings/documents that are jointly being used to support facility/system operation and to support project activities. Changes to these drawings/documents require the approval of both the project engineer and the facility system engineer.

In DMCS, drawings/documents in Shared Status will have a Project field appear on the page with the project code, name and status of that project. The project code will list the project number followed by “/facility” in the project code and the owner will be listed as “Yes.” For additional help, see DMCS-HLP-0043 located in the DMCS help files.

Support drawings. A category of drawings that, in addition to Essential, provides Engineering, Maintenance, and Operations the details necessary for plant operations.

## **6.0 RECORDS**

The following records are generated during the performance of the procedure.

- Drawings
- Sketch drawings (“SK” series)
- Document Management Control System Change Notices form (A-6003-917)
- Lockout/Tagout Sketch Sheet (A-6003-128)
- Excavation, Shoring and Trenching Sketch Sheet (A-6003-916).

The record custodian identified in the Company Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM\_DC-C-02.

## **7.0 SOURCES**

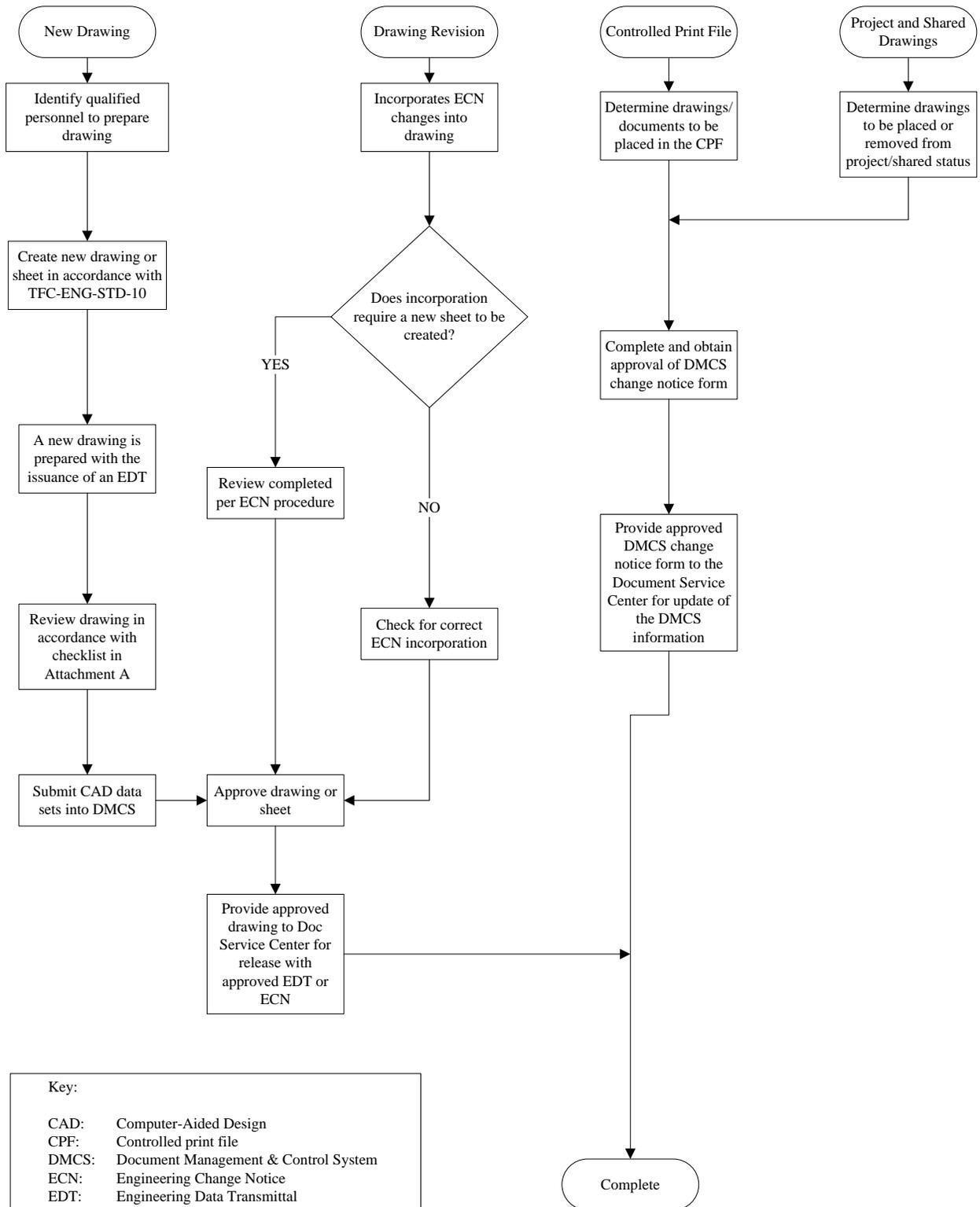
### **7.1 Requirements**

1. 10 CFR 830.122, "Quality Assurance Criteria," Paragraph (f)(4).
2. [TFC-PLN-03](#), "Engineering Program Management Plan."
3. PER-2007-1327.19- JON 4.4, "Establish an Engineering Standard on Confinement for all Tank Farm Designs."
4. RPP-PLAN-39432, "As-Built Program Description."
  - a. Section 3.0, "Terms and Definitions."
  - b. Section 5.1, "Identification and Application of Criteria."
  - c. Section 5.1.1, "Essential Drawings."
  - d. Section 5.1.2, "Support Drawings."
  - e. Section 5.1.3, "Reference Drawings."
  - f. Section 5.1.4, "Criteria for As Built Drawings."
  - g. Section 5.2, "Closeout Process."
5. RPP-PLAN-39434, "Construction and Acceptance Testing Program," Section 4.0, "Responsibilities."

### **7.2 References**

1. TFC-BSM-IRM\_DC-C-02, "Records Management."
2. TFC-BSM-IRM\_DC-C-03, "Information Clearance."
3. TFC-BSM-IRM\_SE-C-03, "Data Security."
4. TFC-BSM-IRM-STD-03, "Unclassified Information Identification Standard."
5. TFC-ENG-DESIGN-C-06, "Engineering Change Control."
6. TFC-ENG-DESIGN-C-25, "Technical Document Control."
7. TFC-ENG-STD-03, "Waste Transfer Confinement Configuration."
8. TFC-ENG-STD-10, "Drawing Standard."
9. TFC-PLN-02, "Quality Assurance Program Description."

Figure 1. Drawing Process.



**ATTACHMENT A – DRAWING REVIEW LIST**

This drawing review list can be used for drawing preparation and review:

Is/Are the drawing sheet(s):

- Compliant with design and project requirements
- Presentation consistent and clear; north arrow is shown when required
- Title block information consistent with the requirements of TFC-ENG-STD-10
- Notes and written instructions are clear, correctly spelled, and valid
- Referenced drawing numbers and standards are correct and current
- Compliant with applicable codes and standards
- Plans, sections, and elevations are properly oriented
- Dimensions and tolerances correct
- Access for operation and maintenance adequate
- Human factors adequately considered
- Properly depicting existing conditions (field conditions, related ECNs)
- Utilities and other interfaces correctly depicted (items on both sides of a match line are correct)
- Symbols correct and consistent with TFC-ENG-STD-10
- Layering conventions consistent with TFC-ENG-STD-10
- Drawing sheet is reproducible (see TFC-ENG-STD-10 for required line weights, lettering sizes, etc.)

**ATTACHMENT B – CRITERIA FOR AS-BUILT DRAWINGS**

(7.1.4.f)

The responsible engineer should work with the project engineer to determine those drawings developed during the project phase of a facility modification that need to be as-built when the project is completed.

The following criteria are used to select drawings required to be as-built, prior to release:

Drawing sheets are to be “As-Built” if they depict structures, systems, or components (SSCs) that:

- Are important to safety
- Are used to establish or verify safe operating condition
- Require routine maintenance to preserve an SSC in a condition so that it can be relied upon
- Are installed in portions of a facility with restricted access or are buried/embedded.
- Are Waste Transfer Confinement Systems (7.1.3)

**Criterion 1: Important to Safety**

Drawings that depict safety class or safety significant SSCs, as identified in the Safety Equipment Compliance Database (SECD) or HNF-SD-CP-SEL-001 (222-S Laboratories Facilities Safety Equipment List), must be as-built.

**Criterion 2: Establish or Verify Safe Operating Condition**

The following additional guidelines should be considered in determining which drawing sheets need to be as-built.

- Operability – Drawings depicting SSCs that are required to operate within established design tolerances, such as:
  - Equipment line-up and valve positions (operating configuration)
  - Pressure limits of equipment/system (e.g., pressure relief valve)
  - Electrical power systems (one-line diagrams, motor control centers)

**Criterion 3: Require Maintenance**

SSCs that require maintenance to ensure that it is in a condition that can be relied upon should be shown on as-built drawings. The following guidelines should be considered in determining which drawing sheets need to be as-built.

- Maintenance - Drawings depicting SSCs that require maintenance, such as:
  - Instrumentation or equipment requiring in the field calibration (e.g., flow transmitters)
  - Equipment requiring periodic replacement (e.g., to support planning)
  - Equipment used for hoisting or lifting (e.g., cranes, hoists, etc.).

**ATTACHMENT B - CRITERIA FOR AS-BUILT DRAWINGS (cont.)****Criterion 4: Restricted Access**

Areas within a facility with physical restrictions for access to an SSC that may be required to support planned or unplanned maintenance, modification, or emergency response should be shown on as-built documentation. The following guidelines should be considered in determining which drawing sheets need to be as-built.

- Confined Spaces – For tank farms, these could include tanks, pits, and other underground structures.
- Difficult to Access – The SSC locations that require scaffolding, man-lift, or similar means to gain access, such as towers, high-bay lighting, and buried tanks.
- Hazardous Environments – The SSC locations that are unsafe due to radiological or toxicological conditions, such as waste tanks, pits, or cells.

**Criterion 5: Buried/Embedded**

Buried or embedded SSCs are not readily accessible for visual inspection. . The following guidelines should be considered in determining which drawing sheets need to be as-built.

- Hazard Potential – The subsurface SSCs that could constitute a safety or environmental hazard, such as buried utility power lines and process piping.
- Sensitive – The subsurface SSCs that, if inadvertently damaged, could cause a significant negative impact on company operations, such as computer networks and fiber optic cables.

**Criterion 6: Waste Transfer Confinement Systems**

Drawings that depict Waste Transfer Confinement Systems as defined in TFC-ENG-STD-03, “Waste Transfer Confinement Configuration.” (7.1.3)

- Utilities – Difficult to detect and locate SSCs in areas of frequent re-excavation, such as buried piping.

Drawing sheets depicting systems not important to safety (e.g., not safety class or safety significant SSCs) that are readily visible, such as support facilities, fences, non-buried instrumentation normally do not require as-building.

## ATTACHMENT C – DRAWING CATEGORIES

(7.1.4.c, 7.1.4.d, 7.1.4.e)

The following drawing categories apply to TOC facility drawings. The category is determined and controlled accordance with Section 4.7 of this procedure. The managers make this determination in collaboration with Operations, Emergency Preparedness, and the system engineer. The drawing category is tracked in DMCS and is not identified on the drawing face.

Essential drawings: A category of engineering drawings that depict active facility (e.g., nuclear and chemical storage facilities) systems, structures, and components (SSCs) and are necessary to support emergency response actions.

Essential drawings include:

- Drawings that are required as a ready reference to operations and emergency response personnel when evaluating and responding to an event condition
- Drawings that are called out by emergency or alarm response procedures.
- Drawings used to identify the correct isolation boundaries for personnel protection while working on deactivated or de-energized systems. The identification of these isolation boundaries is necessary in the cases for electrical or high-pressure fluid systems to implement the lock and tag program.

The following types of drawings are examples that should be considered when selecting essential drawings:

- Piping and Instrumentation Diagrams (P&ID)
- Electrical one-line diagrams
- Ventilation flow diagrams
- Active waste transfer piping diagrams
- Electrical Panelboard Schedules.

Support drawings: A category of drawings that, in addition to essential, provides Engineering, Maintenance, and Operations the details necessary for plant operations.

Support drawings include:

- Drawings that clearly and completely represent the configuration to enable the user to make valid, informed, and timely decisions that directly support the safe conduct of operations
- Drawings required for compliance with active environmental permits
- Drawings required to ensure that process routings and operational readings were being performed correctly and safely within the authorization basis.

**ATTACHMENT C – DRAWING CATEGORIES (cont.)**

The following types of drawings are examples that should be considered when selecting support drawings:

- Electrical elementary and schematic diagrams
- Piping and equipment arrangement diagrams
- Ventilation and exhaust system diagrams
- Process monitoring and control system diagrams.

Reference drawings: A category of drawings that supplement essential and support drawings and provide construction, additional design, or historical information. Reference drawings may be used as “best available information,” but may not be used as the basis for design, maintenance, or operation decisions without confirmation. Reference drawings are not kept current but may be updated to support a facility upgrade or project with approval of an engineering manager.

Reference drawings include construction and fabrication drawings. Change impacts to these drawings are not normally documented and these drawings are not routinely revised. Reference drawings can be obtained using DMCS.

Voided/superseded drawings: A category of drawings that have been superseded by another drawing or drawing revision or have been voided. DMCS image files continue to be available.

These include drawings for cancelled projects and for buildings or facilities that have demolished.