

WP 09
Revision 28

Engineering Conduct of Operations

Cognizant Section: Configuration Management

Approved by: John Garcia



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CHANGE HISTORY SUMMARY

REVISION NUMBER	ISSUE DATE	DESCRIPTION OF CHANGES
28	07/13/10	<ul style="list-style-type: none">• Added requirement for refresher training• Deleted CM04/TRANSCOM no longer in the SDD• Added As-Built Personnel column to Attachment 4

1.0 INTRODUCTION

Washington TRU Solutions LLC (WTS) engineering processes include designs of new structures, systems, and components (SSCs); design modifications to existing SSCs; development of associated design documentation, such as drawings and specifications, procurement requisitions and change notices, installation instructions, and testing of SSCs at the Waste Isolation Pilot Plant (WIPP).

All planned facility modifications and upgrades with an expected life cycle cost greater than \$500K, or as directed by the General Manager based on project complexity and risks, must follow WP 15-GM.01, WTS Project Execution Plan (PXP). All equipment purchases greater than \$2M must have a PXP. The PXP may be highly abbreviated after application of a graded approach to planning. The WTS Department Manager/Senior Sponsor is responsible for this review and approval of the PXP. For projects/tasks and procurements that are of a value less than those specified above, the basic PXP requirements will be met by following the WTS Configuration Management Program as found in the WP 09 series of procedures. The WIPP Configuration Management Program and the system engineering process adhere to the principle of Value Engineering and Value Management as described in MP 1.46.

The purpose of this document is to provide specific requirements and guidance as well as requirements for engineers to perform their specific job tasks through implementation of the WIPP engineering process, systems engineering, and the Configuration Management Program.

This document may generate the following records:

- EA09-2-0, Training Recovery and Work Restriction Plan
- EA09-3-0, Transfer of Cognizance for System/Subsystem
- Designation letter signed by the Chief Engineer assigning a Cognizant Engineer (CE) or Alternate (Alt) CE to a system/subsystem
- Letter signed by the Chief Engineer communicating the successful completion of a candidate's oral board examination

2.0 ASSIGNMENT OF SYSTEMS ENGINEERS

WTS will utilize the Cognizant System Engineer concept defined by DOE Order 420.1B, Facility Safety, to maintain configuration control and the design basis, provide technical support for operations and maintenance, develop short and long-term projects, and provide a technical focal point for each system. This program includes the identification of requisite education, work experience, and training courses required by a designated system engineer prior to qualifying for a system via an intensive oral board. Additionally, an accurate engineering description of site facilities, systems, and equipment is maintained.

WTS will designate Cognizant System Engineers for each site system. Cognizant System Engineers will perform the functions and hold the responsibility identified herein. WTS has historically and continues to identify Cognizant System Engineers by the designation "Cognizant Engineers." Throughout WTS procedures and processes the terms "Cognizant System Engineer" and "Cognizant Engineer" will be synonymous, having the same connotations, implications, and references.

The designation of a CE provides the facility with individuals having the requisite knowledge of the system safety design basis, operating limits from the safety analysis, and lead responsibility for the configuration management of the design.

Based on function, SSCs at WIPP are grouped together into systems that are assigned a system designator. The engineering responsibility for each WIPP system/subsystem is assigned a CE. CEs are the owners of the design of their assigned system(s) and are the primary authority for approving changes to the design details of their system(s). CEs are responsible for the technical management of their assigned systems, including:

- Understanding of the design basis and technical authority for design changes
- Procurement actions
- Modification installation instructions
- Specification of testing parameters to validate design

The Alt CE is designated to act for the CE when the CE is unavailable or away from the WIPP site. If both the CE and Alt CE are unavailable, the "system" or "00" CE has signature authority for everything pertaining to the subsystem(s) in question. In the event that both the CE and Alt CE are unavailable, and the system CE is not available, the Cognizant Manager (CM) has signature authority. Periodic briefing of the CM and Alt CE by the CE concerning system status, current projects and problems, and other relevant information is encouraged. Briefing is expected whenever the CE is aware of a planned absence.

System/subsystem transfer of responsibilities to a new CE includes:

- Reviewing the equipment list.
- Identifying contents of the Engineering File Room (EFR) system file.
- Performing a system walkdown.
- Reviewing open issues.

When the new CE has completed the training and qualification requirements in accordance with Section 3.0, the completed EA09-3-0 form should be attached to the

designation letter. This will document the transfer of cognizant responsibilities for the system/subsystem.

Designation of a CE or Alt CE is achieved via a letter signed by the Chief Engineer with concurrence signature of the CM. This letter, the approved oral examination board documentation, and training completion documentation are located in the personnel training file in the records section of the Technical Training Section/Human Resources Department. The master WIPP Cognizant Engineer/Alternate Cognizant Engineer System Assignment List is controlled by the Chief Engineer (or designee).

Under special circumstances, the Chief Engineer, with the concurrence of the applicable CM, can designate a CE/Alt CE by issuing a letter that demonstrates the CE's knowledge, skills, and understanding of all topics that are covered in the oral board. This letter eliminates the need for the candidate to sit through the oral board examination. This letter shall be issued after the CE/Alt CE candidate has fulfilled the other requirements found in Attachment 4, Engineering Personnel Training Matrix.

3.0 PERSONNEL QUALIFICATION AND SUCCESSION

3.1 CE and Alt CE Qualification and Succession Requirements

To qualify for assignment as a CE/Alt CE, a candidate must meet the following educational and experience requirements:

- Hold a bachelor of science degree in engineering, or equivalent
- Have at least two years of engineering experience, or equivalent, including one year of nuclear experience

In addition to the above educational and experience requirements, the candidate is required to complete the training identified in Attachment 4, Engineering Personnel Training Matrix, any associated refresher training required, and demonstrate technical knowledge of the assigned system(s) via the CE/Alt CE oral examination board qualification process. The training and qualification process is conducted in accordance with WP 14-TR.01. For requalification, refer to WP 09-CN3025, Annual System Walkdown/Requalification.

Once an engineer is designated by his or her CM as a candidate for the position of CE or Alt CE, the following is performed:

- CM or candidate should notify the designated CE/Alt CE Training Coordinator of the candidate's name, the system(s) on which the candidate will be qualifying, and the desired position as either a CE or Alt CE.
- CE/Alt CE Training Coordinator will verify that the candidate has successfully completed all required training outlined in Attachment 4.

- CM will schedule an oral board with the designated Training Coordinator.
- Current system CE will obtain a copy of the applicable system/subsystem oral board questions from the designated Training Coordinator (the board candidate is prohibited from access to these questions during the qualification process).
- Current system CE and CM should review the questions to ensure technical content accuracy, revise as necessary, and submit revisions to the designated Training Coordinator for incorporation into oral board database.
- The CM, current system CE, designated Training Coordinator, and other individuals, as determined, will conduct the board in accordance with guidance in Attachment 5, Oral Examination Board and Training Requirements.
- Cognizant individual of the WIPP Cognizant Engineer/Alternate Cognizant Engineer System Assignment List will generate a change utilizing the electronic document control process.
- The designated Training Coordinator, upon successful completion of candidate's oral board, will generate a letter signed by the Chief Engineer and the applicable CM stating that the candidate successfully completed the oral board (see Attachment 5) and is now the CE or Alt CE of the specified system(s). Copies of this letter are sent to affected CE(s)/Alt CE(s), the Training Coordinator, and the cognizant individual of the WIPP Cognizant Engineer/Alternate Cognizant Engineer System Assignment List.

3.2 Responsibilities

3.2.1 Chief Engineer

The Chief Engineer is responsible for WTS engineering processes. Engineering processes include design of new SSCs, the configuration management procedures, and the System Engineering Program. The Chief Engineer is also responsible for:

- The training/qualification process, including convening and conducting boards to qualify and designate CEs and Alt CEs. Board results are maintained by Technical Training in each CE's or Alt CE's training file.
- Developing the training and qualification requirements, in conjunction with the CMs, for CEs and Alt CEs, as outlined in Attachment 4, including scope, complexity, and nature of the work.
- Ensuring that the CE/Alt CE designation letters are generated, signed, and distributed to the appropriate individuals.

- Verifying with the individual cognizant of the WIPP Cognizant Engineer/Alternate Cognizant Engineer System Assignment List that the appropriate changes have been made.
- Reviewing engineering training modules during periodic reviews or when procedures change, to determine impact on the modules or exams.

3.2.2 Cognizant Managers

CMs are responsible for:

- Adhering to management policies in MP 1.29, Mission, Goals, and Responsibilities.
- Ensuring the content and accuracy of the WP 09-CN3005, Graded Approach to Application of QA Controls, database for cognizant systems/subsystems.
- Ensuring appropriate quality requirement levels are assigned.
- Validating with the CE the inputs to the database and assignment of Quality Level (QL1 or QL2) designations for items, services, and activities.
- Reviewing and approving Engineering Change Proposals (ECPs), Engineering Change Orders (ECOs), addendums, and other documents that require a cognizant engineering manager's approval.
- Approving and verifying Variation Requests (VRs) with the CE/Alt CE, and entering each design change into the Commitment Tracking System in accordance with MP 1.24.
- Adhering to the Configuration Management process.
- Ensuring that the design verification process is adequately followed and documented, as needed.
- Assigning CE/Alt CE responsibilities for WIPP SSCs. The WIPP Cognizant Engineer/Alternate Cognizant Engineer System Assignment List (Cog List) is stored in the Electronic Document Management System (EDMS).
- Ensuring that education and experience requirements for CEs, Alt CEs, and technical staff, as defined in WTS position descriptions and/or this document, are met.
- Defining other training opportunities, as appropriate, for CEs and Alt CEs.
- Developing EA09-2-0 when employees lapse in required training.

- Ensuring the approved walkdown extensions are documented in the WIPP Commitment Tracking System.
- Ensuring that technical staff personnel complete all required training defined by Attachment 4. Engineers must complete the requirements prior to assuming the duties of CE or Alt CE. Special circumstances will be addressed on a case-by-case basis between the CM and the Chief Engineer. Justification documentation defining special circumstances must be submitted to and retained by Technical Training.
- Ensuring that the annual system walkdowns/requalifications are being completed, and that the information is complete and in accordance with the guidance in this document.
- Providing a safe environment for each engineer/technician in which to work, and coaching engineers, and technicians on safe work practices, and the need for safety being our number one priority.
- Responding appropriately to nonconformances and Corrective Action Requests.
- Ensuring proper use of the work instruction template (WIT) by the engineer when generating corrective and modification work orders (WOs).
- Assisting other departments with technical tasks requiring engineering expertise.

3.2.3 Cognizant Engineers/Alternate Cognizant Engineers

In order to maintain consistency among the system's design basis and requirements, system documentation, and physical configuration, CEs and Alt CEs are required to:

- Ensure that the design basis and design criteria are met and that the functional classification is assigned to the SSC(s) when generating new designs or design modifications.
- Ensure that appropriate engineering information is incorporated into the Documented Safety Analyses (DSAs), safety analysis reports for packaging, General Plant Design Description (GPDD), and other System Design Descriptions (SDDs), and regulatory permit applications.
- Establish the quality assurance (QA) controls for assigned SSCs in accordance with WP 09-CN3005.
- Identify any situation where the Configuration Management organization should be consulted for advice or services.

- Identify documents such as drawings, calculations, applicable portions of documented hazard and accident analyses, and vendor manuals that define the design basis for a system important to facility safety. Identify additional documents needed.
- Ensure that system documentation is kept up-to-date, using the formal work control/change control process and the ECP and ECO process to prepare and issue design and equipment specifications, develop and/or update SDDs (in accordance with DOE-STD-3024-98, Standard Content of System Design Descriptions, and WP 09-10, WIPP Preparation Guide for System Design Description Documents), and initiate or change drawings that reflect new designs or proposed modifications and the installed condition after installation.
- Perform design verification, as required, to ensure that designs are technically adequate to meet applicable requirements for quality, safety, and performance, and provide documentation to the engineering files in sufficient detail to verify the design methods.
- Evaluate like-for-like or replacement parts not available from the original supplier (manufacturer), as required by the graded approach database. After an investigation, on a case-by-case basis, the CE will make a decision based on the vendor's ability to provide replacement parts that meet WTS requirements.
- Participate in the identification and resolution of deficiencies or nonconformances.
- Review WIPP procedures and regulatory documents as assigned.
- Independently review designs of other project participants, as assigned.
- Perform the following for new or modified designs, as appropriate: Hazardous Waste Facility Permit (HWFP) screenings as outlined in WP 02-PC3001; Compliance Certification screenings as outlined in WP 02-PC3003, WTS Compliance Certification and PCB Change Screening and Notification of Radionuclide Release or Potential Release; As Low As Reasonably Achievable (ALARA) reviews as outlined in WP 12-2; WIPP ALARA Program Manual, and National Environmental Policy Act reviews as outlined in WP 02-EC3801; Environment Compliance Review and NEPA Screening.
- Ensure Unreviewed Safety Question (USQ) determination screens/evaluations are performed as outlined in WP 02-AR3001 for new or modified designs.
- Develop cost estimates and schedules for new designs or modifications to existing designs.

- Initiate purchase requisitions in conjunction with the design process, including: providing Procurement with the spare parts list to be ordered for new designs and design modifications; providing cost estimates, specifications, and technical evaluation of bids; resolving technical and manufacturing problems associated with requisitioned items; correcting deficiencies; reviewing vendor submittals; and defining special inspections/tests, etc.
- Review procurement documents and Approval/Variation Requests (AR/VRs) for technical adequacy and identify any outstanding design changes in accordance with WP 15-PC3041, Approval/Variation Request Processing.

In order to provide effective, ongoing maintenance and operations activities by ensuring continual evaluation of system performance and involvement in the identification and correction of equipment deficiencies, CEs and Alt CEs shall periodically monitor, review, or perform the following:

- As needed, verify that work control and change control processes are followed.
- Monitor and track the status of the system.
- On an as needed basis, conduct and/or observe equipment performance monitoring, evaluate the results of performance monitoring and surveillance, trend important data, and initiate corrective actions.
- Serve as a focal point for identification of system readiness during operational readiness reviews.
- Perform regular assessments (walkdowns) of the system(s) to ensure continued operational readiness and ongoing modification activities. The Chief Engineer may, via an internal memorandum or letter, designate additional requirements to be performed during the walkdown. Walkdowns are due prior to the end of the month of the anniversary date (annually), or more often, as required. If customer expectations, operational priorities, and/or new emergent work priorities prevent walkdown from being completed on scheduled anniversary date, a one-time 90-day extension can be granted by the Chief Engineer. Failure to complete the walkdown in this additional time frame will result in suspension of CE/Alt CE's qualifications. Walkdowns shall be documented in the Computerized History and Maintenance Planning System (CHAMPS) via a Preventive Maintenance (PM) WO, and by the performance of WP 09-CN3025.
- Provide design and technical assistance to maintenance for work to be performed on plant SSCs and identify spare parts.
- Review and approve post-modification, post-maintenance, surveillance, and special test procedures and test results, as required.

- Identify trends observed in the review of rework and repair work packages, evaluate reports from operations personnel, review operator logs, initiate corrective action to resolve unacceptable system conditions, and sign and return Trending Analysis Mode Compliance Equipment forms (EA10-2-12-0), as required.
- Provide input to maintenance and operating procedures based on design requirements, manufacturer's recommendations, equipment limitations, and regulatory limits.
- Manage the required stocking levels of spare parts for existing systems by collaboration with the maintenance engineer. Periodically review accuracy of information and the need for spare parts in the warehouse database.
- Identify the need for Preventive Maintenance Procedures on spare parts, as appropriate, and provide Work Control with the required information.
- Generate Modification Work Order Instructions using a Work Instruction Template (WIT) and Work Change Notices, as needed, to modify the actual work instructions. Prescribe testing subsequent to a new installation to ensure that the SSCs perform as designed to specified criteria.
- Participate in construction tests and support turnover activities for construction contracts, as required.
- Provide engineering technical support for maintenance activities.
- Provide schedule input for technical support activities.
- Initiate and/or incorporate Modification Impact Sheet for modification work packages, in accordance with approved documents.
- Identify, investigate, and resolve technical problems associated with a new design or design modification.
- Provide incident energy values for electrical work associated with "M" and "A" work order packages.

3.2.4 Training Coordinator

The Training Coordinator is responsible for:

- Scheduling required training for CEs/Alt CEs, including continuing training requirements.

- Ensuring that oral board paperwork is submitted to the Technical Training department for filing.
- Verifying that a candidate for a CE/Alt CE position has successfully completed all required training as outlined in Attachment 4 prior to the scheduling of an oral board.
- Scheduling oral boards with CMs for CE/Alt CE candidates.
- Ensuring that current system CEs obtain copies of board questions and review for technical adequacy prior to the performance of an oral board.
- Ensuring that the oral board database is updated, as appropriate.
- Participating in oral boards, as necessary.

3.2.5 Engineering Technical Personnel

Engineering technical staff personnel are responsible for completing required and continuing training defined in Attachment 4 unless specifically excluded from the requirements by their respective managers and the manager of Technical Training.

4.0 CONFIGURATION MANAGEMENT PROGRAM

Configuration Management is a process which ensures that design requirements, physical configuration, and facility documentation of the SSCs within the WIPP facility remain consistent throughout the operational life-cycle phase of the facility (in accordance with DOE Order 430.1B, Real Property Asset Management). Configuration Management Determination for SSCs are conducted in accordance with WP 09-CN3034. The facility documentation, which includes SDDs, design drawings, specifications, as-built drawings, operations procedures, and maintenance procedures, should accurately reflect the design requirements and physical configuration.

Changes to the design requirements and facility configuration should be reflected in the facility documentation.

Implementation of the Configuration Management Program provides the tools and information necessary for integrating and coordinating activities to ensure that work is done correctly and safely. The Configuration Management Program consists of functions associated with the following program elements: program management, design requirements, document control, change control, and assessments. The program utilizes a graded approach whereby the level of analysis, documentation, and actions necessary to comply with a requirement are made with consideration for relative importance to safety, safeguards, security, the magnitude of any hazard involved, the life-cycle stage of a facility, and the programmatic mission.

4.1 Design Process

WTS Configuration Management control uses the ECP and ECO to document new designs; changes to the design, such as temporary or permanent modifications; and justification for such designs or changes to designs. This ensures that the changes are subject to design measures commensurate with the original design, and that the design analyses for the items are still valid. Changes are approved by technically qualified personnel.

4.1.1 Functional Classification

The functional classification system outlined in WP 09-CN3023, Functional Classification Determination for Design, establishes the relative functional importance of nuclear safety, industrial safety, and reliability functions of WIPP SSCs. The requirement for functional classification is established to ensure that each SSC will perform its function with the appropriate degree of safety and reliability.

The GPDD and the DSA define the functional classification for SSCs.

The functional classification for new or modified designs is evaluated in accordance with WP 09-CN3023.

Application of QA controls for WIPP SSCs are established through the use of WP 09-CN3005.

4.1.2 Design Verification

Design verification is a process that is required by 10 Code of Federal Regulations (CFR) §830.122, "Quality Assurance Criteria" and WP 13-1, Washington TRU Solutions LLC Quality Assurance Program Description. The original Bechtel Design Basis (BDB) and GPDD invoked ANSI/ASME (American National Standards Institute/American Society of Mechanical Engineers) NQA (Nuclear Quality Assurance)-1, Quality Assurance Program Requirements for Nuclear Facilities. The current GPDD invokes ANSI/ASME NQA-1 through WP 13-1, which establishes actions and responsibilities necessary to verify the adequacy of a design. Design verification ensures that a design technically meets the applicable requirements for quality, safety, and performance. Design verification must be documented. New designs or modifications to existing designs require design verification, which is described in WP 09-CN3018.

Design development/qualification testing is performed on prototype or developmental designs that are not a part of, or incorporated into, existing approved facility designs and are not subject to configuration management. When development/qualification testing is used as a basis for selecting a particular SSC to be incorporated into the WIPP facility design, whether performed by on-site personnel or a vendor, test documentation, including definition of the configuration tested, is required. The graded approach philosophy is applied based on the expected ECO (WP 09-CN3007, Engineering and Design Document Preparation and Change Control) or functional

classification (WP 09-CN3023). Testing can be documented by work instructions in an approved WO. A formal test procedure can also be utilized with a format taken from WP 15-PS.2, Procedure Writer's Guide.

Design verification should be performed prior to release for procurement, manufacture, construction, or release to another organization for use in other design activities. When this timing cannot be achieved, the unverified portion of the design should be identified and controlled. In all cases, design verifications will be completed before relying upon the SSC or computer program to perform its functions.

A graded approach is used to determine the level of approval of new designs and design modifications. The level of approval is commensurate with the complexity, consequences of failure, and cost of both the facility and equipment involved. Engineering design and design change approval requirements are provided in WP 09-CN3007. For changes that affect waste handling or the waste path, certification of the design by a professional engineer may be required as a part of the HWFP compliance.

4.2 Start-Up Testing

Start-up testing is performed on systems and equipment, as required, to verify that the system and equipment meet acceptance criteria, operate properly during energization, and can be operated safely. Testing should demonstrate acceptable performance under conditions that simulate the design conditions. Operating or test modes and environmental conditions in which items must perform satisfactorily are considered in determining the design conditions. Start-up testing is performed in accordance with WP 09-SU.01, WIPP Start-UP Test Program.

4.3 Engineering File Room

The EFR is the primary location for current revisions of controlled and uncontrolled engineering documents. EFR personnel provide documents to the satellite controlled drawing stations for surface and underground operations.

The EFR identifies on the Records Inventory and Disposition Schedule those items, including ECOs, ECPs, superseded or inactivated design documents and drawings, and test results, which are to be retained as a permanent record. The EFR is a temporary storage facility for engineering documents.

Documentation contained in the EFR includes:

- Design drawings, as-built drawings, supplier drawings, and sketches. Drawings may be on Mylar, blue line, or sepia; internal to an ECO; or on an aperture card, depending on the time of design and construction.
- A computerized drawing register that provides a listing and cross reference of active, inactive, and superseded drawings.

- A computerized ECO register that provides the status, number, description, and documents affected by each ECO generated.
- Approved ECOs that are active.
- Current operation and maintenance (O&M) manuals for equipment under configuration control.
- Master copies of the GPDD and SDDs, and specifications.

Additional documentation found in the EFR includes parts lists and supplier submittals applicable to installed designs or modifications.

4.4 Original WIPP Design Criteria

Design Criteria RMC-IIA was originally the Title II Architect-Engineer detail design for WIPP. The BDB documents were the original baseline documents. For construction purposes, they identified the basic requirements for all roads, buildings, structures, sanitary systems, repository operating systems, and facility monitoring systems for WIPP. The BDB documents have been replaced by the GPDD and the SDDs.

4.5 Engineering Documents

4.5.1 General Plant Design Description

The GPDD is the baseline general design criteria document for WIPP. The GPDD incorporates the design criteria set forth in RMC-IIA and BDB documents that define general design requirements for WIPP. The GPDD provides the definition of functional classification for WIPP SSCs. Revisions to the GPDD will be reviewed, approved, and tracked through the document control system.

4.5.2 Design Description

The SDDs are documents that define the design criteria, functional operating and performance requirements, and characteristics for WIPP SSCs.

CEs review and ensure that applicable design criteria are incorporated in new designs or modifications of SSCs.

SDDs and the GPDD are prepared and revised in accordance with WP 09-10, and approved by an ECO in accordance with WP 09-CN3007. A list of SDDs is referenced in Attachment 3, System Design Descriptions. SDDs are located on the electronic document control system maintained by Document Services.

4.5.3 Specifications

A Design Specification (D-Spec) establishes requirements and performance criteria for complex or integrated design efforts for which WTS has primary design responsibility. D-Specs are prepared in accordance with WP 09-8, WIPP Specification Preparation.

An Equipment Specification (E-Spec) specifies the design characteristics, functional requirements, operational requirements, and performance criteria for equipment to be purchased from or designed by suppliers and organizations external to WTS, or to be applied to work performed by WTS personnel and contractors. E-Specs are prepared in accordance with WP 09-8.

New specifications and changes to specifications are processed and approved by the use of an ECO in accordance with WP 09-CN3007.

Specifications are located on the electronic document control system maintained by Document Services.

4.5.4 Engineering Calculations

Calculations or analyses that are performed to support proposed WTS designs or design modifications are identified and documented in Engineering Calculation Records. Calculations may be used to support design verification in accordance with WP 09-CN3018.

Engineering calculations are prepared and processed in accordance with WP 09-CN3031.

4.5.5 Engineering Drawings

Design drawings and as-built drawings are initiated or changed by ECOs, in accordance with the instructions in WP 09-CN3007. The types of drawings maintained by Engineering include:

- Piping and instrument diagrams
- Process flow diagrams (including Waste Handling Building and underground ventilation)
- Area, elevation, and layout drawings (including surface, shafts, and repository)
- Single-line electrical drawings
- Control schematics
- Block diagrams

- Loop diagrams
- Logic diagrams
- Wiring or connection diagrams
- Drawings contained in books (such as panel schedules and temporary structures)

Drafting personnel maintain the symbology standards and the computerized symbology library for use in developing and interpreting either board or computer generated engineering drawings.

4.5.6 Component Numbering System

Component numbering is a specific requirement of DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities. Procedure WP 09-CN3021, Component Indices, provides the controlled process for numbering components, which include, but are not limited to:

- Equipment
- Valves
- Dampers
- Piping
- Instruments
- Loops
- Cables
- Conduits
- Structures or facilities

Identification requirements for tags and labels at the WIPP site are also provided. CEs are responsible for initial labeling of facility SSCs. Engineering may number certain consumable items and list them as component indices where WTS performs periodic or routine maintenance on the items to facilitate resource tracking.

Configuration Management personnel maintain component indices in CHAMPS per WP 09-CN3021. CHAMPS contains information associated with each component such as component identifier, description, location, associated drawings, functional classification, manufacturer, item size or type, set points, etc., as applicable.

4.6 Change Control Documents

The change control process provides a record of changes to the facility.

4.6.1 Engineering Change Proposal

An ECP is a document that proposes a technical change to SSCs and associated engineering documents, and the authorization basis. Administratively, ECPs provide for management review and approval of a proposed change prior to commitment of resources. Not all proposed changes to WIPP SSCs require an ECP. Requirements for an ECP are clearly indicated in WP 09-CN3024, Configuration Management Board/Engineering Change Proposal, Attachment 1, ECP Required For:.

4.6.2 Engineering Change Order

The ECO is the engineering document used to define and control the initiation of new engineering design documents, and to define and control changes to approved engineering design documents and plant configurations. The purpose of the ECO is to provide assurance that:

- Configuration control for design documents is maintained.
- The facility is maintained within the approved analyzed design.
- The appropriate design verification measures have been applied.
- A record of design change and approval is established and maintained throughout the life of the design.

ECOs are prepared and processed in accordance with WP 09-CN3007.

5.0 ENGINEERING PROTOCOL FOR NONCONFORMANCE REPORT(S)

Nonconformance Report(s) (NCRs) that identify discrepant as-found conditions (per WP 13-QA3004, Nonconformance Report) require an Unreviewed Safety Question (USQ) screening/evaluation in accordance with WP 02-AR3001. NCR dispositions (repair or accept-as-is) leading to a design change will receive a USQ review via the engineering change process. Type "B" packaging is exempt from the USQ process.

6.0 REFERENCES

- Title 10 Code of Federal Regulations §830.122, "Quality Assurance Criteria"
- DOE Order 231.1A, Environment, Safety, and Health Reporting
- DOE Order 420.1B, Facility Safety

- DOE Order 430.1B, Real Property Asset Management
- DOE Order 460.2A, Departmental Materials Transportation and Packaging Management
- DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities
- DOE Order 5480.20A, Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities
- DOE-STD-3024-98, DOE Standard Content of System Design Descriptions
- ANSI/ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities
- DOE/WIPP-07-3372, *Waste Isolation Pilot Plant Documented Safety Analysis*
- DOE/WIPP-07-3373, *Waste Isolation Pilot Plant Technical Safety Requirements*
- General Plant Design Description
- System Design Descriptions
- MP 1.24, Commitment Tracking System
- MP 1.29, Mission, Goals, and Responsibilities
- MP 1.46, WTS Value Management/Value Engineering Program
- WP 02-AR3001, Unreviewed Safety Question Determination
- WP 02-EC3801, Environment Compliance Review and NEPA Screening
- WP 02-PC3001, WIPP Hazardous Waste Facility Permit Screening
- WP 02-PC3003, WTS Compliance Certification and PCB Change Screening and Notification of Radionuclide Release or Potential Release
- WP 07-1, WIPP Geotechnical Engineering Program Plan
- WP 09-8, WIPP Specification Preparation
- WP 09-10, WIPP Preparation Guide for System Design Description Documents
- WP 09-CN3003, As-Built Drawings: Process and Control

- WP 09-CN3005, Graded Approach to Application of QA Controls
- WP 09-CN3007, Engineering and Design Document Preparation and Change Control
- WP 09-CN3018, Design Verification
- WP 09-CN3021, Component Indices
- WP 09-CN3022, Engineering File Room Operations
- WP 09-CN3023, Functional Classification Determination for Design
- WP 09-CN3024, Configuration Management Board/Engineering Change Proposal
- WP 09-CN3025, Annual System Walkdown/Requalification
- WP 09-CN3031, Engineering Calculations
- WP 09-CN3034, Configuration Management Determination
- WP 09-CN3035, CMS Software Configuration
- WP 09-SU.01, WIPP Start-Up Test Program
- WP 10-2, Maintenance Operations Instruction Manual
- WP 10-WC3011, Maintenance Process
- WP 12-2, WIPP ALARA Program Manual
- WP 12-IS.01, Industrial Safety Program - Structure and Management
- WP 13-1, Washington TRU Solutions LLC Quality Assurance Program Description
- WP 13-QA.05, Suspect/Counterfeit Items Program
- WP 13-QA3004, Nonconformance Report
- WP 14-TR.01, WIPP Training Program
- WP 15-GM.01, WTS Project Execution Plans

- WP 15-PC3041, Approval/Variation Request Processing
- WP 15-PC3609, Preparation of Purchase Requisitions
- WP 15-PS.2, Procedure Writer's Guide
- EA09-2-0, Training Recovery and Work Restriction Plan
- EA09-3-0, Transfer of Cognizance for System/Subsystem
- EA10-2-12-0, Trending Analysis Mode Compliance Equipment

Attachment 1 – List of Acronyms

ALARA	As Low As Reasonably Achievable
Alt	Alternate
ANSI	American National Standards Institute
AR	Approval Request
ASME	American Society of Mechanical Engineers
BDB	Bechtel Design Basis
CBFO	Carlsbad Field Office
CE	Cognizant Engineer
CFR	<i>Code of Federal Regulations</i>
CHAMPS	Computerized History and Maintenance Planning System
CM	Cognizant Manager
D-Spec	Design Specification
DSA	Documented Safety Analysis
ECO	Engineering Change Order
ECP	Engineering Change Proposal
EDMS	Electronic Document Management System
EFR	Engineering File Room
EPA	Environmental Protection Agency
E-Spec	Equipment Specification
GPDD	General Plant Design Document
HWFP	Hazardous Waste Facility Permit
NQA	Nuclear Quality Assurance
O&M	Operation and Maintenance
PM	Preventive Maintenance
PXP	Project Execution Plan
QA	Quality assurance
QL	Quality Level
SDD	System Design Descriptions
SSCs	Structures, Systems, and Components
TRU	Transuranic
TSR	Technical Safety Requirement

Attachment 1 – List of Acronyms

USQ	Unreviewed Safety Question
VR	Variation Request
WIPP	Waste Isolation Pilot Plant
WIT	Work Instruction Template
WO	Work Order
WTS	Washington TRU Solutions LLC

Attachment 2 – Definitions

Acceptance Criteria - Specific quantitative or qualitative standards against which the performance of a SSC is evaluated. Specified limits placed on characteristics of an item, process, or service defined in codes, standards, or other requirements documents.

Accident - A deviation from normal operations or activities associated with a hazard which has the potential to result in an emergency.

As Low As Reasonably Achievable (ALARA) - A concept which governs occupational radiation doses to an individual.

As-Built - Documentation (for example, piping and instrument diagrams, and database records) verified by physical inspections as depicting the actual physical configuration and verified as consistent with the design requirements.

Baseline - A set of configuration items (software, components, and documents) that has been formally turned over and agreed upon, that serve as the basis for further development, and that can be changed through formal change control procedures.

Cognizant Manager (CM) - The WTS manager assigned the responsibility for a defined task or process. In Engineering, the CM is usually a line manager who is responsible for a particular design.

Cognizant Engineer (CE) - The WIPP engineer assigned responsibility for technical management of a design, monitoring performance, initiating the procurement process for manufacture, and identifying acceptability of the procured items or services. The engineer assigned by the CM to develop a design for a particular application.

Configuration - The functional and/or physical characteristics of hardware and/or software as set forth in technical documentation and achieved in a product.

Configuration Management - A management program that establishes consistency among design requirements, physical configuration and facility documentation, and maintains that consistency throughout the life of the facility as changes occur.

Configuration Management Board - A group of WIPP managers and representatives who evaluate ECPs for compliance to approved design and regulatory requirements.

Construction - Any combination of engineering, procurement, erection, installation, assembly, or fabrication activities involved in creating a new facility or altering, adding to, or rehabilitating an existing facility.

Attachment 2 – Definitions

Construction Testing - Tests and inspections performed on a structure, system or component after the construction work has been completed to verify that it has been performed in accordance with contractual requirements and meets the technical specifications, standards, and documents to which the work was done.

Design Development/Qualification Testing - Laboratory or field tests conducted on prototype, pilot, preproduction, or production hardware to verify design adequacy.

Design Document - Documents such as SDDs, specifications (including design, equipment, and packaging), DSA, TSR, WIPP Transport Packaging User Requirement Documents, O&M Manuals, and Engineering Drawings.

Design Output - Drawings, specifications, other documents used to define technical requirements of SSCs, and computer programs.

Design Process - Technical and management processes that commence with identification of design input and that lead to and include the issuance of design output documents.

Design Specification (D-Spec) - A document that establishes requirements and performance criteria for complex and/or integrated design efforts.

Document - Any written or pictorial information describing, defining, specifying, reporting or certifying activities, requirements, procedures, or results.

Documented Safety Analysis (DSA) - A report that documents the adequacy of safety analysis for a nuclear facility to ensure that the facility can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations.

Emergency - An emergency is the most serious event and consists of any unwanted operational, civil, natural-phenomenon, or security occurrence which could endanger or adversely affect people, property, or the environment.

Engineering Change Order (ECO) - An engineering document used to define and control the initiation and changes to engineering designs, associated drawings and design documents.

Engineering Change Proposal (ECP) - A proposed design change which affects currently approved engineering design documents or WIPP SSCs.

Equipment Specification (E-Spec) - A document that specifies the design characteristics, functional requirements, operational, and performance criteria for equipment to be purchased from (or designed by) suppliers and organizations external to WTS.

Attachment 2 – Definitions

Graded Approach - A graded approach is one in which the depth of detail required and the magnitude of resources expended is tailored to be commensurate with the element's relative importance to safety, environmental compliance, safeguards and security, programmatic importance, and/or other facility-specific requirements.

Hazardous Waste - Those wastes that are designated hazardous by Environmental Protection Agency (EPA) regulations.

Independent Review - A review of design, calculations, or analysis for adequacy and correctness, by an individual with the appropriate qualification, experience, and who did not participate in the development of the design, calculations or analysis.

Item - An all-inclusive term used in place of any of the following: appurtenance, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system, or unit.

Life Cycle - A generic term usually applied to acquisition, operation, and maintenance of an item, beginning with concept definition and continuing through disposal and/or decommissioning.

Life Cycle Cost - The total cost of acquisition and ownership of an item over its life cycle. It includes the cost of development, acquisition, support, testing, operation, maintenance, and, where applicable, disposal, decommissioning, and site restoration.

Maintenance - Work that is required to maintain and preserve plant and equipment in a condition suitable to be used for its intended purpose.

Natural Phenomena Hazard - An act of nature such as earthquake, wind, hurricane, tornado, flood, precipitation (snow or rain), lightning strike, or extreme cold or heat that poses a threat or danger to workers, the public, or to the environment by potential damage to SSCs.

Nuclear Facility - A facility whose operations involve radioactive materials in such form and quantity that a significant nuclear hazard potentially exists to the employees or the general public. Included are facilities that produce, process, or store radioactive liquid or solid waste, or fissionable materials.

Normal Operation - Normal operation means steady state operation of the equipment and facility. It includes operation within conditions consistent with the Technical Safety Requirements (TSRs).

Notification - The actions taken to notify cognizant DOE officials of an occurrence.

Attachment 2 – Definitions

Occurrence Report - A documented evaluation of an event or condition that is prepared in sufficient detail to enable the reader to assess its significance, consequences, or implications and to evaluate the actions being proposed or employed to correct the condition, or to avoid recurrence (DOE Order 231.1A, Environment, Safety, and Health Reporting).

Preventive Maintenance - All the systematically planned and scheduled actions performed for the purpose of preventing equipment, system, or facility failure.

Project Execution Plan (PXP) - Program and project management identification of critical information necessary for planning, organizing, and controlling unique work that has a defined start and end point.

Quality Assurance (QA) - All those actions which provide confidence that quality is achieved. (DOE Order 414.1C)

Record - A completed, approved, legible, and reproducible document initiated and completed in accordance with written procedures or instructions that becomes a record upon validation.

Repository - A facility for the permanent deep geologic disposal of transuranic (TRU) waste.

Hazardous Waste Facility Permit (HWFP) - A permit issued by the New Mexico Environment Department and the EPA to receive and manage hazardous waste.

Retrieval - The recovery of TRU waste and the container in which it has been retained and any material contaminated by such waste from the geologic repository at WIPP.

Safety Analysis - A documented process to systematically identify hazards of an operation; describe and analyze the adequacy of the measures taken to eliminate, control, or mitigate identified hazards; and analyze and evaluate potential accidents and their associated risks.

Shall - Denotes a requirement.

Should - Denotes a guideline.

Technical Safety Requirement - TSR are those requirements that define the conditions, safe boundaries, and the management or administrative controls necessary to ensure the safe operation of a nuclear facility and that reduce the potential risk to the public and facility workers from uncontrolled releases of radioactive materials or from radiation exposures due to inadvertent criticality. TSR consist of safety limits, OPERATIONAL LIMITS, surveillance requirements, administrative controls, use and application instructions, and the basis thereof.

Attachment 2 – Definitions

Transuranic - Any radionuclide having an atomic number equal to or greater than 92.

Transuranic (TRU) Waste - Without regard to source or form, waste that is contaminated with alpha-emitting TRU radionuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/g at the time of assay.

Unreviewed Safety Question - A change in facility, experiment, test or procedure that increases the likelihood of an accident, increases the consequences of an accident, reduces the margin of safety for those accidents analyzed in the DSAs, or introduces a new accident not previously analyzed in the DSAs.

Attachment 3 – System Design Descriptions

<u>SDD NO.</u>	<u>NAME</u>
AU00	U/G Facility and Equipment
CA00	Compressed Air System (Incl. CW01-Cooling Water)
CF00-GC00	Plant Buildings, Facilities, & Miscellaneous Equipment
CM00-PC00	Plant Monitoring & Communications
ED00	Electrical Distribution System
EM00	Environmental Monitoring System
FP00	Fire Protection System
GPDD	General Plant Design Description
HV00	Surface Heating Ventilation & Air Conditioning System (Incl. CW02-Chilled Water)
PP00	Plant Protection System
PT00	Packaging & Transportation System
RM00	Radiation Monitoring System (Incl. EM01-Effluent Air Monitoring & PV00-Plant Vacuum System)
UH00	Underground Hoisting System
VU00	Underground Ventilation System
WD00	Water Distribution System
WH00	Waste Handling Equipment

Engineering Conduct of Operations
WP 09, Rev. 28

Attachment 4 – Engineering Personnel Training Matrix

Engineering Personnel Training Matrix					
Training Requirements	WIPP Training	Engineers	Engineering Technicians	Drafting Personnel	As-Built Personnel
A. Facility Organization	General Employee Training (GET 200X, 200X)	X	X	X	X
B. Facility Systems, Components, and Operations	40 hr. Inexperienced Miner (SAF-501) (If required by 30 CFR Part 48)	X ¹	X		X
C. Environment, Safety & Health Orders	Equipment Lockout/Tagout (EQP-405)	X ²	X		X
	Electrical Safety (ELC-103)	X ²	X		X
	Fall Prevention: Elevated Work Space (SAF-641)	X ²	X		X
	OSHA Standards for Construction (OSH-130)	X ³			
	WP 12-IS.01, Industrial Safety Program - Structure and Management (ENG-114)*	X	X		X
	Job Hazard Analysis (SAF-107)	X ⁵			X
D. Codes and Standards Overview	HWFP Screening (SAF-108)*	X			
E. Facility Document System	WP 15-PC3609, Preparation of Purchase Requisitions (CON-004, CON-006, and CON-008)*	X ⁶			
	WP 09-SU.01, WIPP Start-Up Test Program (ENG-115)*	X ³			X
	WP 07-1, WIPP Geotechnical Engineering Program Plan (ENG-113)*	X ⁴	X ⁷		
F. Documented Safety analysis and Technical Safety Requirements	DOE/WIPP-07-3372, <i>Waste Isolation Pilot Plant Documented Safety Analysis</i> (SAF 106) DOE/WIPP-07-3373, <i>Waste Isolation Pilot Plant Technical Safety Requirements</i>	X ²			
G. Material, Maintenance, and	WP 10-2 Maintenance Operations Instruction Manual (ENG-108)*	X ³			X

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Attachment 4 – Engineering Personnel Training Matrix

Engineering Personnel Training Matrix					
Training Requirements	WIPP Training	Engineers	Engineering Technicians	Drafting Personnel	As-Built Personnel
Modification Control	WP 09, Engineering Conduct of Operations (ENG-103)*	X		X	X
	WP 09-CN3003, As-Built Drawings, Process and Control; WP 09-CN3021, Component Indices; WP 09-CN3022, Engineering File Room Operations; WP 09-CN3031, Engineering Calculations (ENG-109)*	X		X	X
	WP 09-CN3035, CMS Software Configuration (ENG-110)*	X		X	
	WP 09-CN3007, Engineering and Design Document Preparation and Change Control; WP 09-CN3018, Design Verification (ENG-111)*	X		X	X
	WP 09-CN3023, Functional Classification Determination for Design; WP 09-CN3024, Configuration Management Board/Engineering Change Proposal (ENG-112)*	X		X	
	WP 13-QA.05, Suspect/Counterfeit Items Program (SCI-101)	X			X
H. ALARA and Radwaste Reduction Program	Radiological Worker I, Initial (RAD-101, 102)	X ⁵	X ⁸		X
	ALARA for Engineers (ALA-102)*	X ²			X
I. Quality Assurance/Quality Control Practices	WP 13-1, Washington TRU Solutions LLC Quality Assurance Program Description (QAP-102)*	X	X		X

* =Self-paced

1 = Engineers with underground responsibilities

2 = Except National TRU Programs (NTP) engineers

3 = Except Geotechnical Engineering and NTP

4 = Geotechnical engineers

5 = For individuals who are expected to remain in the controlled area for an extended period (i.e., more than a few hours) or to make repeated entries, the full training course should be completed, as appropriate to the individual's prior training, experience, and potential exposure risks (DOE G 441.12-1).

6 = Engineers who generate purchase requisitions

7 = Geotechnical Engineering Technicians Only

8 = Except Mine Engineering Technicians

Attachment 5 – Oral Examination Board and Training Requirements

The WTS process ensures that technical support staff personnel demonstrate and document compliance with minimum training requirements in DOE Order 5480.20A, Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities, on the WIPP Training Implementation Matrix, and WP 14-TR.01, WIPP Training Program, except Sections 12.0 through 14.0, which do not apply to the CE/Alt CE training qualification program. DOE Order 5480.20A states that "the contractor shall develop a list of specific technical staff positions that have a direct impact on employee, facility, or public safety." According to the WIPP Training Implementation Matrix, CEs and Alt CEs are qualified positions. Engineers who are responsible for system support to include design, analysis and work package preparation are required to take courses outlined in Attachment 4. Continuing training, based on Attachment 4, must also be completed. Attachment 4 also includes training for geotechnical technicians, drafting, and as-built personnel.

Initial Training

In accordance with DOE Order 5480.20A, training shall be provided to entry-level technical staff personnel who provide technical support to the operating organization in the following facility-specific subject areas as appropriate to the position:

Facility Organization

- Facility systems, components, and operations
- Environment, Safety, and Health Orders
- Codes and standards overview
- Facility document systems
- DSAs and TSRs
- Material, maintenance, and modification control
- ALARA and radwaste reduction programs
- Quality assurance/quality control practices

Continuing Training

Continuing training focuses on the individual maintaining knowledge of significant facility system and component changes, procedure changes and lessons learned applicable to work processes, applicable industry operating experience, selected fundamentals with emphasis on seldom used knowledge and skills necessary to ensure safety, and other training as needed to correct identified performance problems. Time frames for completion of continuing training are determined by the Chief Engineer.

Attachment 5 – Oral Examination Board and Training Requirements

CE and Alt CE Oral Board Questions

Questions to be used at CE/Alt CE oral boards are kept in a database maintained by the Training Coordinator. These include questions based on the SDD and include general knowledge questions based on the required training (see Attachment 4).

Questions that are not listed in the database may be asked during the oral board provided that both the question and the answer are documented on a single page, and there are no objections to the questions by any board member.

Oral Examination Board Requirements

- Board attendees, at a minimum, are the current CE, the CM, and one other person. The designated Training Coordinator will also attend, either as an observer or a board member. Additional participants may be included, as needed and determined by the CM. For vital safety systems, the CM will send a letter to invite the cognizant Carlsbad Field Office (CBFO) safety system oversight staff and the CBFO Facility Representative to observe the oral examination board. Examination board records should include the names and job titles of the CBFO observers.
- Board attendees will meet prior to board commencement during which time board questions (general knowledge and system) will be reviewed by all board members to determine what questions will be asked. Each board member will ask the candidate questions.
- A candidate may bring research material to the board or take a time out to research a question that he/she cannot answer directly. The use of research material will include procedures, drawings, specifications, etc., with the exception of the SDD. The SDD cannot be used by the candidate at any time during the oral examination board.
- When all the questions have been answered and the oral board is concluded, the candidate is excused. The board members discuss the performance and technical knowledge of the candidate and determine whether the candidate has successfully completed the oral board. All board members must be in agreement to pass a candidate.
- If all members do not agree that a candidate has successfully completed the oral board, then a new board is scheduled no sooner than five business days from date of failure. The participating training coordinator will compile and verify that appropriate board paperwork is satisfactorily completed and submit board paperwork to Technical Training.

Attachment 5 – Oral Examination Board and Training Requirements

- If a candidate fails the second board, the candidate's CM and the Chief Engineer must meet to determine whether candidate should be removed from the CE/Alt CE qualification process.
- If all members agree that a candidate has successfully completed the oral board, the participating training coordinator will verify that appropriate board paperwork is satisfactorily completed and submit board paperwork to Technical Training.
- Upon submission of paperwork documenting the candidate's successful completion of the oral board to Technical Training, a letter is signed by the Chief Engineer and the applicable CM stating that the candidate successfully completed the oral board and is now the CE or Alt CE of the specified system(s). Copies of this letter are submitted to the affected CE(s)/Alt CE(s), the Operations Support Manager, and the Training Coordinator.

Requalification of CEs and Alt CEs is accomplished via completion of annual system walkdown(s) and successful completion of continuing training. Annual system walkdowns are documented in CHAMPS.